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EIGHTIETH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

For example, CHAIN-LINK FENCE

BETHANIZING, Bethlehem's new process for zinc-coating wire, turns out a product that is better in so many ways that it benefits both the manufacturer and user of any article made from galvanized wire.

Take chain-link fence. Before Bethanizing, the customary way to make chain-link fence was by the difficult galvanizing-after-weaving process. That was because no galvanized wire was available that could stand the weaving. And the heaviest possible coating was about 1.2 oz. per sq. ft., not enough to give satisfactory life under unfavorable conditions. Such coatings are of uneven thickness and crack under stress.

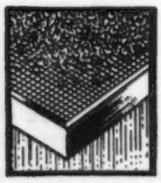
Bethanized Wire now opens the way to make chain-link fence by the simpler method of weaving from coated wire. A Bethanized coating stands the bending and twisting of weaving without cracking. But even more important is the fact that any desired weight of coating can be used—twice or even three times that possible with the former method. The Bethanized product is better looking, too. It has a silvery lustre that lasts for a long time.

That is how Bethanized Wire improves chain-link fence. Similar considerations are leading to its use for other products, as mentioned below.

Bethanizing permits the use of steel springs with their superior physical properties in pumps and other locations where alloys have been used. And Bethanized Wire makes possible zinc protection on bed- or cushion-springs for marine, hospital and outdoor service.

For telephone and telegraph service, Bethanized Wire offers the advantage of a coating that can be put on as heavy as the conditions call for. Higher tensile strength can be provided than is possible in wire coated by the hot-dip process. Bethanized Wire splices without surface cracks.

The service life of strand can be much increased by making it of heavily-coated Bethanized Wire. Thick Bethanized coatings stand being woven into strand without damage. Abuse in erection will not cause cracks that offer places for rust to start.



In screen wire the heavier coatings which Bethanizing makes possible are especially useful as, under the abrasive action of the material being screened, the life of a coating is about proportional to the thickness. A 2.4 oz. Bethanized coating lasts about three times as long as the usual hot-dip galvanizing.

Bethanized Wire, with its smooth, silvery finish, makes an excellent material for spokes in the wheels of baby carriages, tricycles and similar wire-wheeled vehicles. The fabricating operations do not damage the coating.

Bird cages and other wire articles in which appearance and serviceability are important offer a broad field for the use of Bethanized Wire. The smooth, bright surface of the wire results in a product of added salability.

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Private Initiative for Labor

BUSINESS has been assured, by the President, that the principle of private initiative, which has been the mainspring of business progress, will be maintained in this country.

This means, of course, that the individual business man, or the concern of exceptional capability and progressiveness, will at least have an opportunity to earn a profit reward commensurate with the service that he renders. If that service is great, this principle opens the door to large rewards; if it is small, or non-existent, the door is closed proportionately. Thus the deadly averaging of regimentation, with its inevitable damper on effort, is avoided.

One might well ask why the benefits of this principle of private initiative should not also be preserved for labor?

The great majority of our business and industrial executives of today were not "born to the purple." They came from the "ranks of labor," using this term in its broad sense to include humble clerical as well as physical workers. And what better training than this could be devised to give these men both a broad knowledge of affairs and a sympathetic understanding of the labor that they now direct?

It is good for labor to have such men come from its ranks, not merely because it encourages others in humble positions to try to do likewise but because such advancement also leads to improvement in the lot of the average worker who may not receive promotion. Labor would be worse off today, not better, had not Edison, Ford, Schwab and countless others scaled the heights. The surest way to handicap the progress of the average working man is to put obstacles in the way of his exceptional brothers climbing to a position of executive leadership.

That is one of several reasons why we believe that the interpretation of 7-a as given by the President and by Donald Richberg is much more beneficial to labor than that of Senator Wagner and the A. F. of L. which insists on exclusive bargaining by majorities. Under the former interpretation, the exceptional man is enabled to capitalize on initiative and ability. Under the latter, he is suppressed by the deadly rule of averages.

If the privilege of capitalizing exceptional initiative is worth preserving for the employer, why should it not be equally safeguarded for the worker?

PRICE FIXING IN ANCIENT CHINA

There is a literature of managed economies in China which goes back at least 3000 years.

DICTATED ECONOMIES;

THE advocates of managed economy for this country believe they have discovered a new and sure panacea for all economic ills. Yet the truth is that down to about 150 years ago the peoples of the world almost invariably lived under dictated economies; and for that very reason the race made less progress in the first 4000 years of recorded history than it has made in the last 150 years under a regime of economic freedom.

A planned economy is necessarily an imposed economy; a system that the planners—that is, the rulers—believe will best serve their purposes, and that they are able to force upon the people.

The very essence of such dictated economy is autocracy. That is true whether it is forced upon the people by despots as it was in China 3000 years ago, by emperors as it was in Rome 1500 years ago, by Kings as it was in England four centuries ago—or by a Stalin, a Hitler, or a Mussolini today.

Autocratic governments have always dominated the economic institutions of their countries. With force as their primary instrument, rulers have played upon superstition, ignorance, fear and the abject helplessness of their subjects. Political freedom and managed economy are abhorrent to one another. They cannot be maintained side by side; they never have been; they never will be.

Dictated economies, whether of the oriental world, or under the imperialism of Rome, or the despotisms of the middle ages, or the fascist, communist, or Hitlerist regimes of today, have always inculcated in the community an overweening spirit of nationalism; a fear and hatred of the outsider, the foreigner. Thus war has been made an instrument alike of political policy and of the economic system.

Autocratic governments have made wars to expand their territories and widen the areas from which they might exact tribute. So in the modern world we see the countries of managed economies armed to the teeth and threatening the world with new and always more terrible wars—wars for wider markets and control of natural resources.

Whether two thousand years ago or two decades ago, dictated economy has meant dictated government. There can be no controlled economy without government absolutism. A dictated economy must be administered with the iron hand. There must be universal acquiesence in it—no opposition; no party divisions, no factions, no freedom of opinion, no freedom of discussion, no freedom of the press. These are conditions precedent—and they are today's conditions in Russia, Italy, Germany, Austria—wherever there is government dictatorship of industry and business. When dictated economy comes in, democracy goes out.

It is the purpose of this and succeeding articles in this series to prove the foregoing statements by marshalling and analyzing the truths of history and experience.

Yesterday, Today and Tomorrow

By JOHN H. VAN DEVENTER
Editor, THE IRON AGE

BIBLICAL history presents almost endless examples of the evil workings of dictated economies. One was afforded by that Pharaoh who in the execution of his PWA program set the Hebrews making bricks without straw. That resulted in the oppressed and suffering Hebrews seceding in a body from Egypt. As the Hebrews were the best workers and the best brains of the country, their loss left Egypt in a bad way. The record of the exodus and what followed it might well have warned that modern economic manager, Hitler, against forcing a modern exodus of the Hebrews. But the economic dictators are not students of history; learning nothing, forgetting nothing, but posing as apostles of social salvation, they are the most devout Bourbons of all times.

The story of Joseph and the Pharaoh he served, as told in the book of Genesis, deserves a re-reading in the light of NRA. When the great famine fell upon Egypt, Joseph, who had previously stored great quantities of grain, gathered all the money in the land "and brought the money into Pharaoh's house"—just as our economic planners gathered all the gold into the treasury.

Thus controlling both the food and the money, Joseph fed the people, and took their cattle; and later, when they came seeking food, saying they had nothing left "but our bodies and our land," Pharaoh took their land in exchange for more food. Then, removing the people from the land, he herded them into the cities.

Here we have an Egyptian parallel to present procedures by which the Government through loans to farmers is coming to control their land; and also a parallel to the present-day plan of removing large populations from what our planners call, and what Pharaoh would probably have called, the marginal lands. Later, having got all the money, land, cattle and complete control of the people, Pharaoh had a seed distribution to the people and sent them back to the land as his tenants, requiring that one-fifth of all their produce should go to him. This exaction may seem severe; but really it was moderate when compared to this country's taxes last year, amounting to one-third of the national income. Pharaoh was easier with his tenant than our modern economic planners are with us.

While we are looking into ancient Egypt it is worth while to recall that the pyramids are perhaps the world's most spectacular monuments to economic management. The Pharaohs, absolute rulers as all efficient economic planners must be, built the pyramids to be their tombs. The building of them was one of the chief occupations of the Egyptian common people; whole armies gave their lives in this grueling toil.

Then there is the story of the first Suez Canal, which was built so long before the Christian era that nobody has a very definite notion to what period it dates. Anyhow, such a canal existed as early as 1400 B. C. After a time it fell into disrepair, and the Pharaoh Necho, who was the big economic planner of his time, set his people building a new one. He never got it finished, but Herodotus records that his attempt to construct it cost the lives of 120,000 of his subjects.

Ancient China, also, was long on economic planning, which reached to everything from building the Great Wall to controlling prices and production, policing markets, and supervising all commercial and industrial activities. Just as in Egypt forced labor constructed the pyramids, canals and other public works, so in China the Great Wall, the Grand Canal and other monumental works stood for the sacrifice of uncounted human lives. Our modern economic planners of course would make their drafts on human resources less directly; they would pay their workers; but the money with which to pay would be raised by taxing the whole community, which means a tremendous reduction in the general standard of living. Thus the National Industrial Conference Board finds that in 1933 the cost of all government in the United States—and that cost largely represented the expenses of managed economy—was about one-third of the national income. It may

GOVERNMENT'S HAND WAS IN EVERYTHING

be doubted whether any of the managed economies of the ancients exacted a heavier toll from the people.

Price Fixing in Ancient China

There is literature of managed economies in China which goes back at least 3,000 years. A Chinese writer on Confucius and his economic ideas gives a graphic picture of efforts at fixing prices and manipulating supply and demand, as early at least as the fifth century B. C. His account indicates that the Chinese economic dictators made determined efforts to control prices; to fix and maintain them continuously at substantially an unchanging level which was presumed to represent equity for both the producer and the consumer.

Giving the picture of this system as it operated in one city, our author tells us that every shop had a superintendent and all goods had fixed prices. For every twenty shops there was a master of merchants whose duty was to fix prices according to the cost of producing the articles. Rejecting all the rules of reason and economic law, it was maintained that even when there was a crop failure and ensuing famine, corn should still be sold at the same prices that were maintained under normal conditions; and during a great epidemic it was decreed that coffins must be sold at their regular prices.

The scheme necessitated an army of officials, inspectors, overseers and other functionaries. An auditor of price had authority to see that the government-fixed prices were not departed from by merchants; but the government itself sought to control supplies by raising or lowering prices so as to induce larger or smaller production according to the needs of the time. Then there was a government bank, quite strikingly like some of the financial agencies which our Administration has set up; its function was to buy up the surpluses, when such existed, and to hold them until it was possible to feed them out to the people at the fixed level of prices prescribed by the government.

Ancient Enforcement Methods

All this was difficult of enforcement, and the market places were scenes of much bickering and confusion. The police became an important part of the marketing system, the gate to the market being guarded by two policemen armed with whips and halberds. Then for every two shops a policeman was kept on guard, and over each ten shops was a captain of police to keep order and suppress disorderly people. Finally, a detective was assigned for every five shops, to see that all the other functionaries performed their duties as honestly as might be.

The plan for government to purchase supplies, particularly foodstuffs, and hold, store and sell them at the fixed prices, simply didn't work. The heathen Chinese of those early times was as peculiar as he is —and the rest of us are—today. A ruler named Han Ming Ti, being insistent on it, was presently confronted by one Liu Pan, who declared that while the scheme was supposed to protect the people against extortion, it was always taken advantage of by the rich who got control of things and in spite of everything the numerous officials could do, extorted large profits. When grain started to move to market, after harvest, in large quantities, the employees of the government warehouses offered very low prices for it, with the result that the private merchants got most of it. When they had bought up enough to be comfortably in control of market, they started raising the prices. So the farmers complained that they got only the lowest possible prices while the government, taking only the surplus after the merchants were satisfied, always paid a high price. The government plan of carrying sufficient stocks to control the market and equalize prices proved a failure, but it helped the merchants to increase their profits at the expense of the people. The government stocks of grain frequently were wasted, for when there was famine the government officials who were sometimes corrupt and sometimes merely fearful of incurring losses would not dare issue to the people the grain they held in storage. In the end, whether as a means to keep prices reasonable or to insure against shortages, the plan utterly failed.

Dictated Economies of Ancient Rome

The Roman Empire was, in the view of many analysts of history, a victim of planned economy. Those who take this view tell us that the Empire's decline was largely due to the vast expenditures in monumental structures and public works for ornamentation of the cities and aggrandizement of the planner-rulers. The diversion of human energy and interests from useful to merely grandiose and spectacular constructions amounted to a burden that was beyond the people's capacity. Observing the magnificence they were creating out of their poverty for the enjoyment of the planner-rulers, the people gradually sank into despair, lost their morale, became doubtful about a patriotism which demanded so much and at length lost the will, the spirit, the "virtus" that had been the real basis of Roman power.

The parallel between economic conditions during the declining years of the Roman Empire, and those in the Euro-American world today, is impressive; as is, also, the parallel between the futile measures by which the Roman rulers attempted to cope with these conditions, and the economic dictatorships which various Occidental countries have recently set up. America's New Deal appears to include a wide array of the blunders in Roman policy that contributed to the Empire's decay.

Prof. Rostovtzeff, of the Chair of Ancient History at Yale, in his "Social and Economic History of the Roman Empire," presents a picture of economic distortions in the ancient world that is illuminative of the American scene today. Observing that the Roman rulers of the second and third centuries realized the economic weaknesses of the Empire but were helpless to cure them he comments:

> Their constructive measures were puerile and brought no relief. To save the state they resorted to the old practice of the ancient world—the policy of force and compulsion. The result was the acute economic crisis of the third century, which brought about the rapid decline of business activity in general, the resuscitation of primitive forms of economy, and the growth of state-capitalism. These were the salient features of life in the fourth and following centuries.

But before attempting an analysis of the economic factors in Rome's decay, we must first call attention to two distinguished exceptions to the ancient world's rule of economic despotism and civic decline. One is the Periclean Age in old Athens; the other, the Augustan Age of Rome. Each of these was an age of *laissez faire*; of free competition, of high industrial and commercial enterprise, of economic opportunity, and of abstinence from state interference with economic law.

The Great Greek Democrat

Pericles has been called "The Completer of Greek Democracy." Under his leadership Athens reached both its cultural and its material heights. Because historians have placed most emphasis here, we think of the age of Pericles as chiefly notable for achievements in artistic, literary and intellectual areas. But in fact the Athens of Pericles was a shipping, commercial and industrial metropolis; a factory town; a community of merchants and traders, whose commerce reached wellnigh the whole of the then known world. The Periclean Greeks carried machine manufacture farther than it had ever been carried before; they even developed a good deal more than the mere rudiments of the system of mass production. They were particularly skillful in adapting their products to the special needs, requirements and tastes of their customers. Their merchant shipping was extensive, their traders enterprising and daring. In this era, Greece stood in much the same relationship to the ancient world that Britain occupied toward the 19th century world; it was the headquarters of industry and commerce.

HALF THE EXISTING VINEYARDS WERE DESTROYED

Pericles, had he lived 2,500 years later, would have been a devout follower of Adam Smith economics; and he would have been, also, a leader in that movement of democratization which marked the 18th and 19th centuries. Under him, the glory that was Greece flowered from institutions of political democracy and economic freedom.

And similarly, under Augustus Caesar, the grandeur that was Rome crowned policies which aimed at the largest measure of popular freedom, and the least measure of governmental intrusion into the economic realm. Augustus too would have been a follower of Adam Smith. Inheriting the purple after a long period of devastating civil wars, he set himself to reordering and rehabilitating his empire.

But Augustus was no economic planner. He believed that if democratic institutions were set up, and if the people were left open opportunity and free competition, natural forces would work out the best possible results. And under him Rome wrought its way out from the ruins of civil wars, into a period of such prosperity and widespread welfare as has made his name synonymous with our highest conception of human satisfactions.

Lonesome Exceptions

But students of history find that Pericles and Augustus were lonesome exceptions among ancient potentates. The rule was that the state imposed its control on the economic establishment; the government was the dominating capitalist; its hand was in everything; taxes were oppressive, officials multiplied, bureaucracies fattened—and decay set in. The agencies through which government thus laid its paralyzing hand on enterprise, the methods of its operation, were astonishingly like the agencies and methods which have been recently imported into the scheme of American life.

The emperors had enormous personal fortunes, controlled the state's revenues and commanded the armies. So the senate gradually surrendered its authority to the emperors; permitted them to raise and to spend the funds; and finally became a mere shadow of its former self. The process of this surrender to the emperor was indeed not so rapid as that by which the New Deal congress has abdicated in favor of the President; but it was essentially the same. Its end was the destruction of Roman freedom, and the ruin of the empire.

This centralizing of everything in the emperor made the provinces constantly more dependent upon Rome and enabled the emperors more and more to intrude into the details of provincial government. Revenues were so centered at Rome that when an insurrection or famine or other calamity befell, such as a great earthquake in Asia Minor, Rome was called upon for aid. The provinces became progressively less capable of caring for themselves, less effective as supporters of the central government. It was the same thing that is now happening to our system of dual sovereignty; the federal government is absorbing to itself the revenues,

powers and responsibilities that once belonged to the states. Washington advances relief funds to the states; organizes agriculture and industry under administrations and codes; votes hundreds of millions for relief; advances vast sums to embarrassed cities and towns; invests in stocks of banks; provides loans to farmers and home owners, and guarantees their obligations. By exactly these methods the political rulers and economic dictators of Imperial Rome established that domination, political and economic, which led unerringly to the crash.

Ancient Vineyards Plowed Up—Like Modern Cotton!

Both Italy and Greece in this period were largely dependent on imported foodstuffs, chiefly from Egypt and Southern Russia. The Imperial Government encouraged production of grains in these countries, while the vineyards of Italy, and its olive groves, supplied wine and olive oil. Likewise there was a vast commerce among all the Mediterranean countries in all manner of manufactured articles. Ultimately, however, Spain and Africa became great producers of olive oil, while wine was produced well-nigh everywhere.

These developments, at first encouraged by the economic planners, ultimately threw everything out of gear; a time came when vineyards had so crowded out the grain fields that there were shortages of food and surplus of wine. Here again we find the parallel to conditions which have obtained throughout the modern world since the World War.

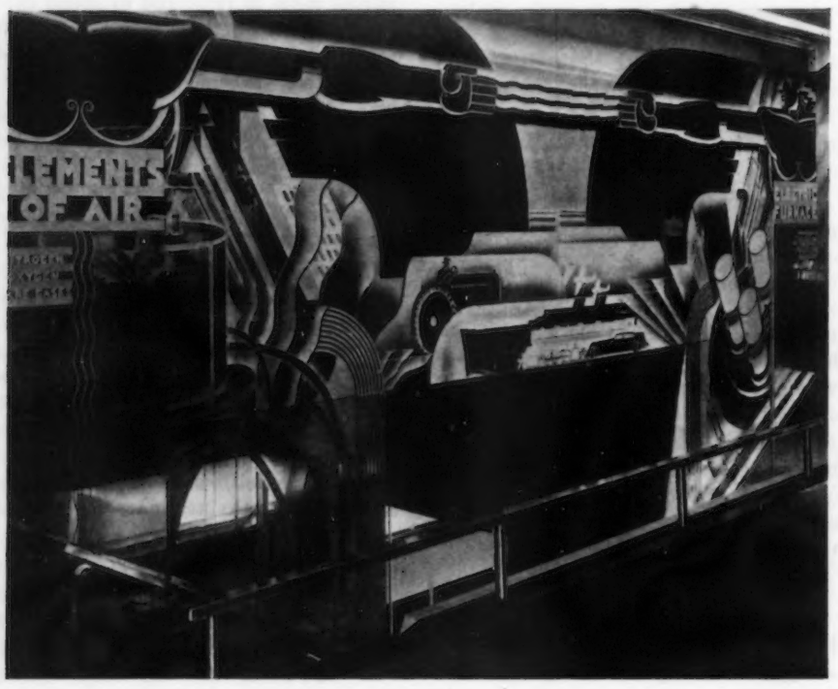
Finally conditions became so bad that the Emperor Domitian issued orders to promote larger productions of grain, but requiring that no new vineyards be planted in either Italy or the provinces, and that half the existing vineyards be destroyed! Thus was provided a precise precedent for plowing up every third row of cotton, and hiring the wheat farmers not to raise wheat!

The scheme of destroying the vineyards was not highly successful, and there is a story of a famous orator, Scopelianus, from Asia Minor, who campaigned against this program at the risk of his neck, quite as some are just now protesting against certain measures of AAA. Scopelianus secured a cancellation of the order to destroy the vineyards in Asia Minor. But in Africa, Spain, parts of Gaul and the Danube basin, the vineyards were duly plowed under. Later on there was a shortage of wine and a new order was issued to resume the cultivation of vineyards! This order even authorized Britain to produce wine; the economic planners didn't realize that they might as well have ordered bananas grown in Iceland!

These various projects demoralized the small farmers, who, unable to adapt their methods to the revolutionary regulations, sold their lands to the capitalists of the cities. These tried to work them in huge units, somewhat as the bonanza wheat farmers of our western plains have done. With land ownership by non-resident capitalists, while the farming was done by tenants and hired hands, the situation was not unlike that our Government is promoting through its loans to farmers—a long step toward nationalizing land ownership and making the farmers tenants of the Government. The independent small farmers of Italy struggled under an increasing burden of mortgages, quite as those of the United States are doing nowadays.

Horace, Pliny and other writers have told how they lived in the cities and operated their estates through tenants; a system unsatisfactory to the landlords and which proved ultimately ruinous to agriculture. At first the lands, after they had fallen into the hands of capitalists, were farmed by tenants; but the tenants became dissatisfied, moved to town and joined the breadlines; slaves were next engaged; and agriculture sank lower than ever.

(To be continued)



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THE artistic possibilities of stainless steel are well illustrated in this mural, displayed by the Union Carbide & Carbon Corpn., at A Century of Progress exposition in Chicago. It was made of thin sheets of stainless steel and the design sandblasted on it. An occasional washing has served to maintain its original gleaming appearance for two years.

▼▼▼

How Attractive Finish Helps Metal Products Sales

26—Enameling and Lacquering

By HERBERT R. SIMONDS

MANUFACTURERS in the metal working industry are interested in paint from two distinct angles which, for convenience, may be described as (1) preservative processes, and (2) production processes. Fabricators of large steel products, such as cranes, culverts, pipe lines, tanks, and freight cars, and those who produce general structural steel work, approach the subject of painting from the angle of preservation. Some problems under this head were described in the first article in this paint group which appeared in The Iron Age, Aug. 9.

The manufacturers of portable metal products which are turned out more or less on a mass basis are interested in paint as a production process. In this group of manufacturing are such diverse items as machine tools, automobiles, washing machines, cash registers, lawn mowers, and an almost endless variety down to cans, buttons, and bottle tops.

This miscellaneous assemblage accounts for products running into billions of dollars annually, and affords the chief outlet for enamels and lacquers. Some problems in the use of enamels and lacquers in metal parts production are considered in this second article of the paint group.

THE manufacturer who produces in quantity any item on that large list of metal products which includes the range from automobiles and machine tools, to bottle tops and buttons, is chiefly interested in three fundamental features in his approach to the problem of enameling or lacquering. These features are sales value, durability, and cost.

Sales value, which for many products is the most important feature, is an intangible and elusive quality. In most cases it has to do with color and luster, and in this connection a few generalities may be stated. Bright and pleasing color contrasts with the avoidance of bizarre effects and with a smooth, rich finish usually have the greatest power of attracting sales. It is important of course to suit the color and the type of finish to the specific product in question. Metal parts for interior architectural use must blend with surroundings. Pastel shades generally are unsuitable for strictly utilitarian parts. For parts which are to be handled frequently, such as tools, the public seems to prefer a dull finish rather than a high polish, and this is fortunate because a high polish would be more difficult to maintain in service.

Technique Is a Consideration

Another point to consider in selecting the finish for a metal product is the technique of application. This subject perhaps more properly comes under the heading of cost, but, independent of cost, the size of the part and the nature of the base metal often limit the selection of enamel or lacquer. The Ferro Enamel Corpn., Cleveland, for example, has recently developed an enamel intended specifically for use on copper. This company states: "We can now produce white or any of several colors in one coat over clean copper."

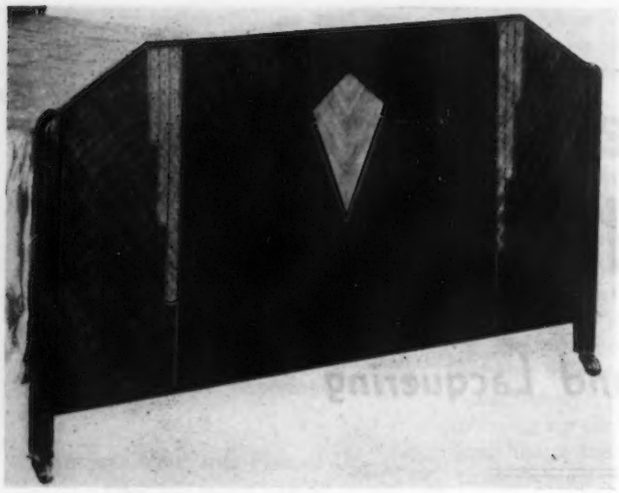
Another important factor in sales value of a metal product is style. Not many years ago a bright colored machine tool or machine tool part would have lacked much of the sales appeal which it has today, and it is safe to say that color is more important on metal products now than it has ever been before. Certainly the manufacturer of products sold directly to the public should know something of the relative appeal properties of different colors and different color combinations.

In a previous article in this series, a good deal of data was presented about color, and many harmonizing combinations were suggested. However, for most small products, the manufacturer who is facing the problem of selecting a finish should consider even the best advice as suggestive rather than conclusive. Having selected several plausible kinds of finish for a metal product, the surest way of determining relative sales value of any one is by experimenting, that is, by actually finishing the same product in several different ways and testing the relative sales volume.

Tests Vary

Even here another difficulty presents itself in that tests in different parts of the country vary. In some conservative sections bright colors for useful products sometimes give way to more sedate finishes, yet sales managers are continually being surprised at the so-called whims of the public in relation to color and to product finishes. Few people would have advised bright colored typewriters before one company had the courage to try them out.

In some cases color may have a practical value. For instance, certain



The ingenious use of masks and stencils makes it possible to produce at relatively low cost elaborate inlay designs such as this on metal furniture panels.

Courtesy, Greenpoint Metallic Bed Co., Inc.

combinations are more legible at a distance, and light colors, such as aluminum, reflect and radiate heat better than dark colors. Thus, other things being equal, a light colored radiator is more efficient than a dark one.

Durability

Almost as important as the initial appearance of a product is its ability to withstand normal service and still remain attractive. Certain colors are more durable than others, and this fact often must be taken into account. An article finished in a non-permanent color will usually fade unevenly, with the result that the product is no longer a credit to its manufacturer. William J. Miskella, in a book on color, warns against certain pigments as being nearly always fugitive. Paint pigments originally were taken from the earth, and earth pigments now form an important part of enamel coloring. They are noted for durability. The need for new combinations and also the growing scarcity of some of the earth pigments led to the development of coal tar products and other synthetic pigments. A description of a few of the chief pigments used in paint, as abbreviated from Mr. Miskella's book, may be of interest.

Cobalt blue is a compound of oxides of aluminum and cobalt. It is permanent to light, is unaffected by alkali, lime or acids, and can be mixed with any other pigment or color. The chief difficulty is its high price. Because of this, ultramarine blue is frequently substituted.

Prussian blue, sometimes known as steel blue, is formed by precipitating potassium or sodium compounds with ferrous sulphate and oxidizing the resulting pale bluish precipitate into a dark blue. This pigment has a fair permanence for ordinary use on metal products. It discolors, however, in contact with alkalis. It fades gradually in outdoor exposure. It has a fine texture which prevents its settling in the vehicle in enamel production, and is extensively used for dip coating steel products.

The so-called bronze paints use finely divided metals as pigments. Thus an aluminum bronze paint usually has as its pigment metallic aluminum.

Several kinds of brown pigments are available for paint use. One of these is obtained by roasting iron ores. Another, known as Vandyke brown, is found in the earth, usually near bogs. On metal it is used chiefly in applying imitation wood finishes.

Burnt umber is a rich brown color extensively used for graining on metal.

One of the best greens is known as irridian green. It does not fade and mixes readily with other pigments.

Madder Lake, which is a sort of bluish red, is now made from coal tar and, although used for enamels and lacquers on metal work, is relatively expensive. One of the best reds, known as toluidine, is a coal tar product. It is permanent and does not bleed.

Chrome yellow is brillant, has good hiding power, and is fairly permanent.

Most of the above pigments may be mixed to form new colors. Chrome yellow, however, should not be mixed with any pigment, such as ultramarine blue, which contains sulphide, as sulphide tends to change the yellow to black.

The method of applying an enamel or lacquer has much to do with its permanent character. Frequently protective undercoats or priming coats are used, and on iron and steel these priming coats should be of a character to prevent corrosion.

Cost of Lacquering

Lacquer for commercial use may cost about $3 per gal., but this is only a small part of the total finishing cost. Some examples of cost given in a previous article will afford an indication of general practice. One manufacturer estimates that through the entire metal working industry the cost of lacquer finishing will average about 3 per cent of the total cost of the product. A modern cash register weighing about 50 lb. is finished at a unit cost of $1.50, which means a cost of 3c. for each lb. of product. An average automobile takes a gallon of lacquer and the entire finishing operation costs upwards of $10. Both of these examples are of a somewhat specialized character. For small parts which can be automatically coated, the relative cost drops appreciably. Elaborate spray coating equipment has been developed for lacquering such products as cameras, clock parts, electrical fixtures, lamp shades, builders' hardware, metal trays, radio parts, and buttons. The actual cost of lacquering a metal product may be relatively unimportant if the nature of the finish has sufficient sales value. Thus, manufacturers of high grade automobiles take elaborate pains and use much skilled handwork in developing just the right sort of attractive finish.

Enameling vs. Lacquering

The processes of enameling and lacquering overlap and in many cases are strongly competitive. One of the chief points of difference between the two is in the method of drying. Lacquers are usually air dried and enamels usually baked. This distinction, however, does not hold with some of the new synthetic enamels and there are cases where lacquers are baked and enamels are air dried. It was the quick air drying feature of lacquers

Even automobile parts which are normally hidden from view are frequently enameled. This Burgess intake silencer is coated with black baking enamel especially designed to resist oil and gasoline fumes.

that first introduced them to the automobile industry and today practically all makes of cars use lacquer for finishing. Recently, it is true, one of the lower priced cars turned back to enamel, claiming that a harder finish was thus secured. In this case the enamel is baked, which means extensive oven equipment.

As already pointed out, a true lacquer, according to the long established terminology in the tin plate industry, consists of a varnish base with a color added. The popular term "lacquer" has a much broader application, however. A varnish with a transparent gold pigment is a popular finish for such items as powder can bottoms, vegetable can ends, bottle tops, and a great number of inexpensive stamped products where the appearance is of secondary consideration. In the tin products trade, if a lacquer has an opaque color it is no longer called a lacquer but instead is called a "coating."

Lithographing Over Enamel

A process closely associated with lacquering is lithographing. Strictly speaking, lithographing is a method of applying a coating, and not a coating, yet the lithographed finishes are generally known by that term. A lithographed metal tray may be made as follows: A sheet coated with an enamel background in a neutral tint is furnished by a steel company to the lithographer who then prints on this sheet whatever decorative design may be desired. This may be done with lacquers, special enamels, or, more commonly, with lithographing ink.

The sheets containing the lithographed design are then sent to the tray fabricator where without injuring the surface they are pressed into the form of the finished tray and are then ready for shipping. Many of the larger lithographing companies are equipped to do the fabrication as well as the lithographing. Thus lithographing of decorative cans nearly always is a production process in the plant of the can manufacturer. Some such manufacturers buy plain sheets which they lacquer or enamel, and others buy enameled sheets from the steel companies.

Steel Works Do Enameling

From this it may be seen that steel companies often are in the enameling business. Actually the coating of certain types of sheets in flat stock on the part of steel companies is increasing. This is due primarily to the fact that the paint manufacturers in recent years have been able to produce enamels which are sufficiently elastic and which have a strong enough bond when applied to steel sheets to enable the sheets to pass through even severe subsequent drawing and stamping operations without surface injury.

Generally speaking, a lacquer does not build up as full a finish with the same number of coats as does enamel. Also, lacquer usually does not adhere to bare metal as well as enamel. Thus it is common practice to use a priming coat preceding the application of lacquer. This practice in the automobile industry has already been pointed out. Most manufacturers feel that a lacquer finish on metal provides a more durable surface when exposed to the weather than that developed by the usual oil enamel. Not long ago, in fact actually within the past year, certain new synthetic enamels have been developed which are claimed to be more durable under exposure to the weather and more resistant to abrasion than the best lacquers. If these claims are substantiated, renewed strenuous competition is sure to come between lacquers and enamels in the metal working industry and particularly in the automobile branch of that industry. In the refrigerator field there is already keen competition between the porcelain enamels and the newer synthetic enamels. One of the largest manufacturers in this field, although using porcelain for its highest priced refrigerators, is now using a highly satisfactory synthetic enamel for all other models.

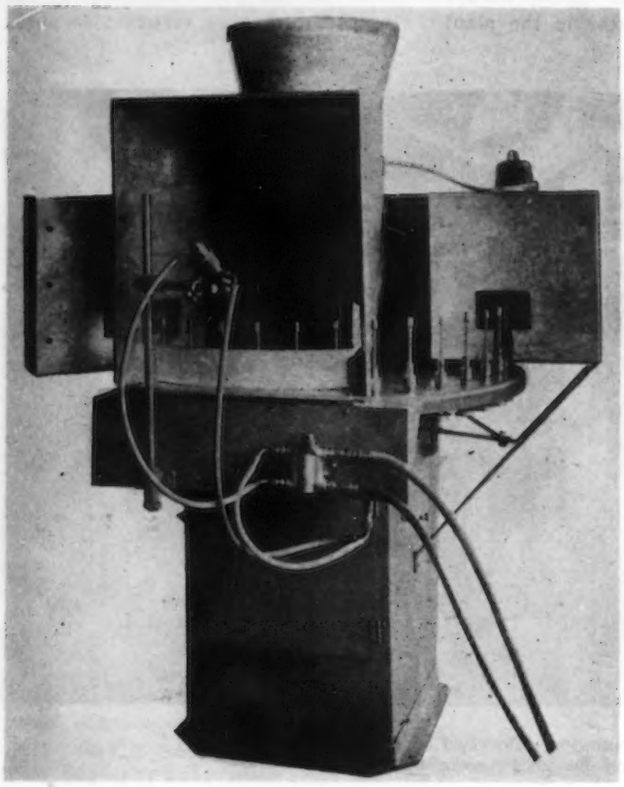
Automatic operations are common in the process of enameling automobile body parts. Here such parts are passing on a continuous overhead conveyor through the Bonderizing sequence preparatory to enameling.

Metal bathroom tiles are an example of another competitive field between porcelain and the synthetic enamels, and here the lower drying temperatures required for the synthetic enamels gives them an advantage at least as far as unit cost goes.

Uses for Enamel

Outside of the automobile field, enamels, both oil base and synthetic, con-

stitute by far the most extensive coating in the metal working industry. Some of the principal outlets for enamels are metal furniture, stoves, cash registers, signs, telephones, electric fan bases, and light fixtures. Other extensive outlets are washing machines, trucks, sewing machines, scales, railway equipment, adding machines, bicycles, machine tools, kitchen ware, filing cabinets, clocks and instruments, cameras, decorative packages, metal trays, dishes of many varieties, and buttons.



Small metal articles, such as thimbles, bottle caps, and pencil parts, are usually enameled on automatic machines of which this is one type.

Courtesy, The DeVilbiss Co.

With the exception of agricultural machinery where standard paint still seems to be preferred, and the automobile, where lacquer is preferred, most metal products which are coated for attractive finish are enameled. Those engaged in research work in this field state that the future for synthetic enamels is most promising. They say that progress so far seems to indicate the development of an enamel which will dry at low temperature, or perhaps may even be air dried, and which will have at the same time a surface sufficiently elastic for deep drawing and sufficiently hard to withstand abrasion.

The quality of abrasion resistance often becomes an economic problem through the fact that parts coated with enamels having this quality can be shipped in bulk, and thus save crating and boxing expense. Recently a manufacturer of parts used in connection with city water hydrants changed the type of enamel used and by this process alone was able to save nearly 10 per cent through boxing and shipping economies. Heretofore rigid municipal inspection made it necessary to individually box the parts, as a scratch was sufficient cause for rejection. With the new finish the manufacturer was able to load the parts, without boxing or crating, into a truck and drive them to the city warerooms without scratching them.

Selecting the Coating

Some of the difficulties of selecting the best coating for any specific article have been mentioned. Perhaps the best way to give suggestions to a manufacturer would be to consider the experience of some who have solved the problem. A manufacturer of small flashlights at first bought tin coated steel sheets with an enameled coating put on by the steel company. At this stage in his experience the cases were made by forming and pressing without soldering, but in order to produce a more accurate product which would give better service, the manufacturer desired to solder the case. It was found at once that the soldering operation discolored the enamel, consequently plain tinned steel sheets were used. These were made up into cases by soldering, and afterwards the completed units were enamel coated. At this point difficulties developed because the temperature required for baking the enamel had a tendency to melt the solder. Therefore a change was made to a lacquer which would dry at a low heat and thus not injure the solder.

This particular finish was fairly satisfactory and the manufacturer continued to use it for some years, but eventually, partly because of the expense and partly because he had difficulty getting the lacquer to stick to the tin, he changed again. He submitted his problem to a paint manufacturer who developed a new type of synthetic lacquer which had excellent bonding qualities with the tin coat. Now the whole cycle has started over again because the company has discovered a new enameled sheet which is not discolored by the soldering operation.

This lengthy experience indicates the rapidly changing conditions in the metal finishing field, and shows that a problem solved today may not be solved tomorrow when new materials may become available.

When manufacturers of buttons desired to use metal with a lacquer finish they immediately discovered that ordinary lacquer was adversely affected by the strong solutions used in laundries and also by the severe treatment in pressing. Seeing a possible new outlet slipping because of this difficulty, lacquer manufacturers were quick to cooperate with the steel button producers and today have developed a special button lacquer which not only withstands all laundry solutions but which will not break or crack under mandrel and flatiron pressing. In a similar way enamels have been developed for use in washing machines, to withstand the soaps and washing solutions.

A manufacturer of metal furniture supplies the following procedure for a high quality finish. The parts are given two priming coats and finishing coats with spray guns in well ventilated spray booths. Two men work in each booth on opposite sides of certain pieces of furniture. After each coat the parts are dried at 125 deg. F. before proceeding to the next booth. Color combinations are applied by masking or shielding certain parts with paper which is later removed. Final decoration is by hand and the final coat of lacquer is water sanded with fine sandpaper and then air dried with pressure jets. Slight defects are touched up by hand and later con-

cealed by applying a so-called mist coat of lacquer.

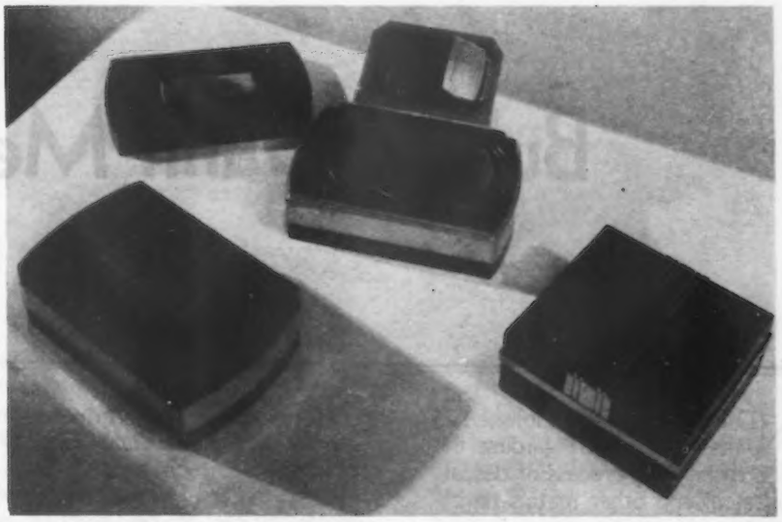
For this type of finish and with the usual lacquers 1 gal. of lacquer will cover from 400 to 500 sq. ft. of surface with one coat. In order to duplicate the hand rubbed effect on certain quality pieces of furniture, aluminm or zinc stearate is added to the lacquer.

For bar fixtures and bar furniture which must be coated to withstand alcohol, special enamels and lacquers are available. A manufacturer of cash registers has changed a former popular wood grain to a morocco finish, which has an advantage in that it does not reflect light as much and yet seems to have an equal sales value.

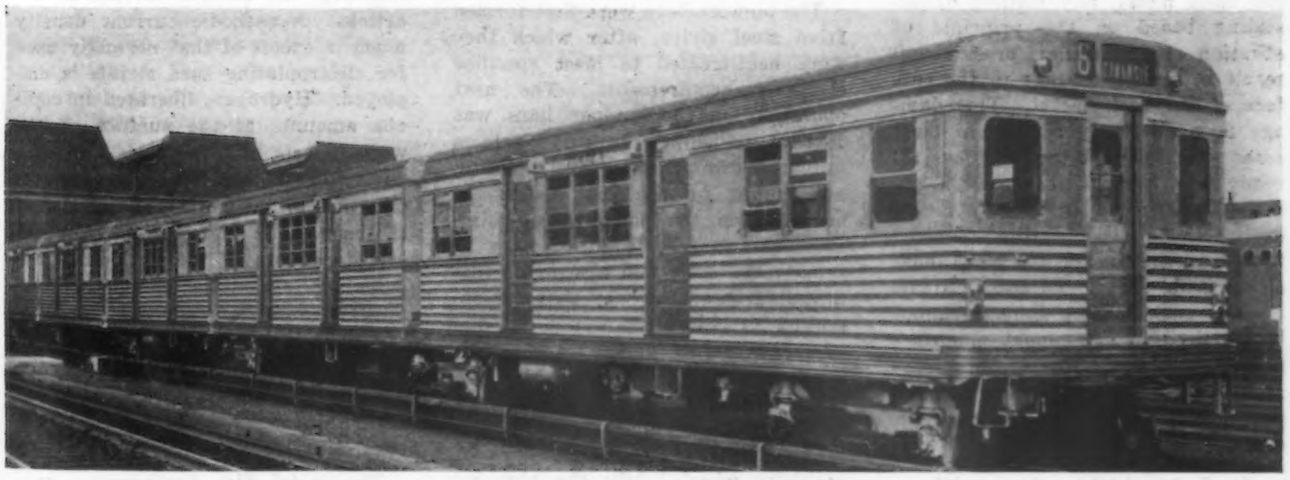
Enameling Steel Sheets

The manager of a steel stampings plant describes his enameling process as follows: Sheets containing 4 sq. ft. of surface are fed through a continuous machine at the rate of 100 sheets per min. The cycle includes a baking period of about 25 min. and for this operation the sheets are up-ended on a conveyor in order to save space. The oven, in order to accommodate the production of 100 sheets per min. must have a total capacity in excess of 2500 sheets for its 25-min. period, and if it were not for this up-ending feature the length of the oven would be prohibitive.

After the company has decided upon the desired appearance of any one product, an excellent method is to refer the problem of actual selection of coating material to a reputable paint manufacturer. By picking a manufacturer which produces both lacquers and enamels, any objection due to competition between these two coatings will be eliminated. Often the coating material can be purchased by specifying the result rather than specifying the ingredient. Manufacturers generally should be cautioned to pay more attention to the finishing operation and not consider it as merely an added or supplementary process. It often happens that when a type of finish is given due prominence in the entire sequence, other preceding operations may be changed to advantage. The nature of the metal itself is sometimes changed to accommodate a particular type of enamel or lacquer finish. Some companies make steel sheets with special finish for receiving enamel. The Republic Steel Corpn., Youngstown, Ohio, makes sheets of this character. The Burgess Battery Co., Chicago, coats its automobile silencers with black baking enamel in order to give them high resistance to oil and gasoline fumes. The silencer itself is made from terne plate.



Parts of decorative boxes are frequently automatically enameled, leaving other parts plated and polished. This is done with the use of paper masks.



CAR weight has been reduced to 250 lb. per passenger in this new light weight five-section car built recently by the Edward G. Budd Mfg. Co., Philadelphia, for service on the elevated lines of the Brooklyn-Manhattan Transit Corpn. Operating speed has also been increased. The car is framed entirely of 18-8 stainless steel and shot welding was employed throughout in fabricating the five bodies. Trucks are mounted in noise and shock deadening rubber and the floor is of inlaid cork, which not only adds to passenger foot comfort but insulates against sound and cold. Adjacent ends of each two sections rest on a common truck.

Bullard-Dunn Metal Descaling

NO little has been published in these columns regarding the electrochemical process of descaling steel and other metals developed at the works of the Bullard Co. under the Dunn patents. Recently, however, the authors of the accompanying article found that duriron anodes were notably advantageous, doing away, for example, with the need of frequent renewal of the electrolyte.

The article is an extensive reprinting of a paper contributed to a meeting in New York, Sept. 29, of the Electrochemical Society. By the Bullard-Dunn process the metal article to be descaled is made cathode in a hot acid sulfate bath containing a small amount of metal salt such as tin sulfate. A protective film of tin or other metal is progressively formed over the cleaned points or areas and pitting, etching, smudge formation and permanent embrittlement, it is emphasized, are avoided.

METHODS for descaling metals long used in industry, such as sand-blasting, shot-blasting, scratch-brushing, tumbling, or hand-rubbing, remove scale by abrasion. Pickling removes scale by chemical erosion. Since the basis metal is decidedly more vulnerable to abrasion and also to acid attack, and since the scale layer is neither uniform in thickness nor bonded uniformly to the basis metal, any method of descaling based on the principle of abrasion or of chemical erosion will result in serious damage to the surface of the basis metal. This damage is particularly serious in most cases where part of the scale has already been removed, because the exposed basis metal is badly attacked during the additional time required to remove the thicker and more tenacious scale from adjacent areas. Usually such surface damage cannot be repaired in subsequent manufacturing operations. Furthermore, surface defects due to descaling are particularly costly when precision dimensions are altered.

Applied to Making Automobile Bumpers

The experience of the Bullard Co., in making automobile bumper bars, led to the finding of an electrochemical process for descaling metals which is simple, economical and wholly free from the objections to the older methods based upon abrasion or chemical erosion. Their experience is of particular interest since in making bumper bars every item of cost had to be kept to a minimum in order to meet the prevailing intense price competition.

The bumper bars were first formed from steel strips, after which they were heat-treated to meet specified elasticity requirements. The next operation on the bumper bars was that of polishing the surface to a mirror finish prior to electroplating and buffing for the final luster. In order to do the polishing at minimum cost it was first necessary to remove the scale and also to do this descaling in such a way that the descaling process itself would not disturb the surface of the bars underneath the scale layer. Polishing the bars covered with scale is a very expensive operation, because the scale rapidly glazes the surface of polishing wheels, dulls the abrasive and generates excessive heat which destroys the adhesive used to hold the abrasive to the face of the polishing wheel. As a result, frequent polishing wheel renewals or dressings are required. Furthermore, flakes of sharp scale score the steel surface so that the number of separate wheel operations required to produce the final lustrous finish prior to electroplating is materially increased. Polishing bars which have been acid pitted and etched is also an expensive operation because such polishing must be preceded by an operation of grinding the whole surface of the bars below the depth of the deepest pit.

The Process in Brief

Since the older methods of descaling failed to give satisfactory results, Thomas E. Dunn, of the Bullard Co., carried on an intensive research which led to his discovery of a method by which the scale layer is separated from, and without damage to, the basis metal surface, regardless of the variations in either thickness, tenacity or distribution of the scale layer and regardless of the duration of the descaling treatment.

The process consists in making the work or steel part the cathode in an acid electrolyte of low pH. The bath contains metal ions, such as tin or lead, which are deposited as a thin film over the cleaned surface of the article. A cathodic current density much in excess of that normally used for electroplating such metals is employed. Hydrogen, liberated in copious amounts at the surface of the work "blasts off" the scale and concurrently a metal film is electrodeposited on the work. The function of the metal film is to protect the descaled portions of the work until the descaling action is completed and until the work is removed from the tank. It is believed that this metal deposit, wedging its way between the basis metal and the scale, is also effective in bringing about the scale removal.

The metal film furthermore prevents the work from becoming permanently embrittled, possibly by preventing the acid from destroying the intercrystalline cement. By comparative tests on spring steel samples it was found that those samples which were acid-pickled became permanently

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Process

By COLIN G. FINK and T. H. WILBER*

embrittled, whereas those treated by the Bullard-Dunn process showed no trace of such damage. The real cause of permanent embrittlement by acid-pickling processes is still under discussion. It is our opinion that it is caused by the destruction of intercrystalline cement at the surface of steel as a result of etching. Since the Bullard-Dunn process does not etch the surface, no destruction of intercrystalline cement takes place and, therefore, no permanent embrittlement results.

How Remote Surfaces Are Reached

This metal film finally plays another important role in that it imparts a "throwing power" to this descaling process. This "throwing power" is proportional to the hydrogen overvoltage potential of the metal selected for the protective film. Since such metals as lead or tin, each of which has a high hydrogen overvoltage, can readily be used for this protective film, this process possesses a high "throwing power." The origin of this high "throwing power" is clear after an examination of the cell action.

When work covered with scale is placed in the cell, a film of hydrogen is developed about the work. As the scale is lifted from the basis metal, areas thus denuded are covered simultaneously by the electro-deposited metal film. This metal film builds up a counter-electromotive force (equal to the value of the hydrogen overvoltage of the metal film) which acts as an added resistance in the current paths leading to these metal covered areas.

A portion of the current then shifts automatically to paths of lower electrical resistance, that is, to those paths leading to areas still covered by scale, thereby concentrating the current and increasing the current density over the scale-covered areas. Thus recessed parts and remote surfaces such as the bottoms of blind holes, gear teeth and the like are descaled as thoroughly as the more exposed surfaces, and the average time for descaling such recessed work is less than it would be if a process were used that possessed no "throwing power."

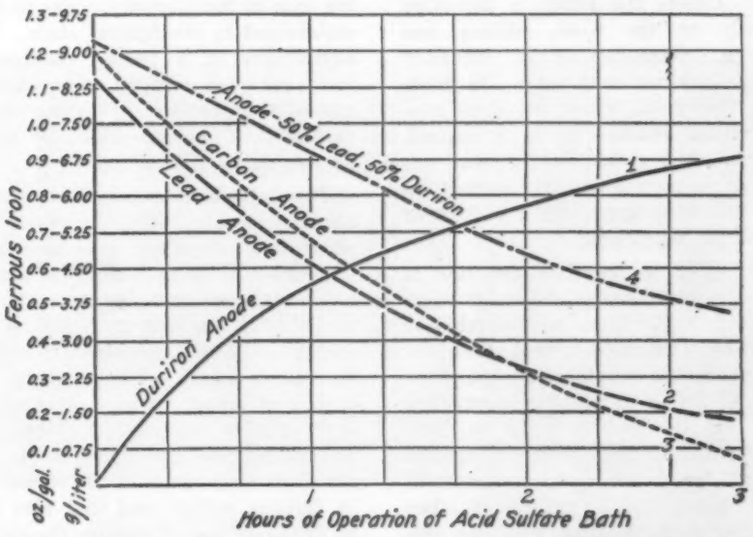
The protective metal film is not to be confused with metal plates obtained in electroplating. This film does not build up in thickness upon continued electrolysis, as in the case of electroplates. After the protective metal film is laid down, further metal discharge results in a loose spongy deposit.

In carrying out this invention one of the original electrolytes used was an aqueous solution containing: H_2SO_4, 47.5 g. per liter; HCl, 10.3 g. per liter; NaCl, 22.5 g. per liter.

Lead was used for the protective metal film. The purposes of the chloride content of the electrolyte was to corrode the lead anodes used and thus furnish the bath with its required lead content. The bath was operated at temperatures ranging from 150 to 180 deg. F. The cathode current density was approximately 75 amp./sq. ft.

This process, carried out as just described, removed all traces of scale from the bumper bars in 3 to 5 min. The bars were then polished in the ordinary way, after which they were plated with nickel, copper, nickel and finally chromium. The lead film deposited in the electrolytic descaling treatment was removed from the front sides of the bars in the polishing operation. This film was not sufficiently thick to load the polishing wheels or to interfere, in any other way, with the polishing operation. The film remaining on the back sides of the bars, and in the eyes or holes, served to retard surface rusting while these bars were being carried through the polishing operation and during the time lapses prior to plating.

In order to apply the "nickel strike" directly to the steel, the first treatment preparatory to the electroplating operation itself was that of a reversed-current alkaline electro-cleaner. This electro-cleaner removed the dirt and grease which accumulated during polishing and also the lead film which still remained on the back sides of the bars and in the eyes.



The Duriron anode changes an initial high ferric ion concentration to a high ferrous ion concentration, just the reverse of the behavior of the other anodes.

As a result of the complete and thorough descaling, degreasing and defilming, the electrodeposited coatings were far superior to those previously obtained. They were free from pits and pores and adhered perfectly over the entire surface of the bars. The Bullard-Dunn process greatly reduced the cost of production, lowered the total time per unit manufactured and improved the quality of the finished product.

To investigate the application of this electrochemical process under varying conditions, other types of parts, such as complicated forgings and heat-treated gears, were treated, using the same equipment and procedure developed for the descaling of bumper bars. Also metals other than lead, particularly tin, were employed as a protective film.

The bright and clear appearance of tin gives greater visibility of surface defects in the basis metal. Also tin anodes dissolve readily in a sulfuric acid electrolyte, no chlorides being needed as is the case when lead is used for the metal film. Thus a single acid, namely sulfuric, serves to furnish the acid content of the electrolyte and the corrosive effect of chlorides, particularly on heating coils, is eliminated from the process.

The Iron Content of the Bath

During the descaling treatment the electrolyte gradually built up an iron concentration as a result of the acid attack on the scale after the latter had been removed from the work. As this iron content increased, the descaling action slowed down and it became increasingly difficult to deposit the necessary protective metal film. Unless the latter is deposited rapidly on the work, pitting and etching, characteristic of ordinary electro-pickling, take place. In practice, therefore, when the iron concentration reached 1 to 3 oz./gal. (7.5 to 22.5 g./L. Fe), it was advisable to reduce this iron concentration by discarding either a portion or all of the electrolyte.

In order to lengthen the life of the electrolyte and stabilize its operating characteristics, a research was instituted which disclosed that the source of the trouble was the presence of ferric iron in the electrolyte and that the process could be operated without diminution of operating efficiency, even at iron concentrations approaching saturation, when the iron in the solution was kept predominately in the ferrous state. This experience checks that of George D. van Arsdale and others in the electro-winning of copper. Furthermore, the lead peroxide formed on the surface of the lead anodes used acted catalytically to intensify the oxidation of the ferrous iron. It therefore became evident that the solution of the problem lay in either (a) reducing the ferric iron as rapidly as it was formed, or (b) preventing the iron from being oxidized to ferric iron.

In carrying out procedure (a), various reducing agents, particularly SO_2 gas, were tried, but all were found to be unsatisfactory commercially. In carrying out procedure (b), the electrolyte was separated into catholyte and anolyte by means of porous cups. Obviously the ferrous iron was thus prevented from coming into direct contact with the active oxidizing surface of the anodes and this procedure, therefore, solved the problem from the electrochemical angle. A number of practical difficulties, however, were encountered as, for example, the cost of the cups, the tendency of the cups to clog, the excess space taken up by these cups, the fragile nature of the available and suitable materials and the marked increase in the internal resistance of the cell. As a consequence these difficulties made the porous cup or divided cell impractical.

Duriron Anodes

Further research in combatting ferric iron led to the discovery of hitherto unrecognized characteristics of silicon alloy anodes. A cast ferro-silicon alloy, known in the trade as duriron, was found to be most practical. Operation with these silicon alloy anodes disclosed the fact that the iron in the electrolyte was largely maintained in the ferrous state. The advantages of a porous diaphragm were achieved without encountering any of the practical operating disadvantages of porous cups or semi-permeable partitions.

The introduction of these silicon alloy anodes in connection with this electrolytic descaling process makes it possible to operate the bath almost indefinitely without the necessity of periodically bleeding or renewing the solution. Continuous plant operation is thus assured. To maintain the bath over longer periods, it is necessary only to replace the water lost by evaporation and drag-out, to replace the acid spent in the formation of ferrous sulfate and that also lost by drag-out, and to remove the excess ferrous sulfate by crystallization. Fortunately, the process operates efficiently at high concentrations of ferrous sulfate and at these concentrations the removal of iron by crystallization of ferrous sulfate is a comparatively simple procedure.

For example, a sulfate bath which had been operated hot had an iron concentration as high as 10 oz./gal. (75 g./L.). A temperature drop down to 60 deg. F. removed about 2 oz. of iron per gal. and a temperature drop to 40 deg. F. removed a total of about 5 oz. of iron per gal. (7.5 g./L.). In the winter time this can be accomplished in many places without resorting to artificial refrigeration. Elimination of the dumping of the acid electrolyte solves the problem of the disposal of spent acid and saves chemicals, labor and time. In some instances and localities stringent waste disposal regulations make it well nigh impossible to get rid of spent pickling solutions.

It is interesting to compare the behavior of these silicon alloy anodes with the action of carbon and lead anodes, when used in the same descaling bath. The curves show a record of four test runs using anodes of duriron, lead, carbon and a combination of lead and duriron anodes. The purpose of these tests was not to record the rate of oxidation or reduction, but merely to show that oxidation and reduction took place. However, curves for duriron and carbon may be compared with respect to oxidation rate, as can also those for lead and the combination of lead and duriron anodes, because the conditions under which the tests were run were the same in each of the two cases. It is particularly interesting to compare the results recorded by curves 2 and 4. By replacing one-half of the lead anode surface used in curve 2, with duriron, a marked slowing down in the rate of ferrous ion oxidation resulted.

Ferro-Silicon Anodes Together With Tin Anodes

In using the silicon alloy anodes in connection with the Bullard-Dunn descaling process, optimum operating conditions are obtained when these anodes are used for the total anode surface employed. However, if the metal content of the bath needed for the deposition of the protective film is to be maintained by anode corrosion, a metal must be selected which is so soluble as an anode that only a very small portion of the total anode area required for the electrification of the bath need be furnished by the anode from which this film metal content is derived. Tin fulfills this requirement remark-

ably well and in practice a tin anode area of only 1 per cent to 2 per cent of the total anode area required will maintain the electrolyte with an ample tin content. This combination of silicon alloy and tin anodes has the net effect of maintaining the iron in the solution predominantly in the ferrous condition.

Removing the Protective Metal Film

In the description of this electrochemical process of descaling, much emphasis has been laid on the deposition of a protective metal film over the basis metal. It is well to add that whenever it is desirable to finish the process of descaling with the basis metal completely denuded, as, for example, when the process is employed to descale and render stainless steel passive, the protective metal film can be removed readily, quickly and completely by making the work the anode in an alkaline electrolyte composed of an aqueous solution of caustic soda and trisodium phosphate. The following formula for this electrolyte gives excellent results: NaOH, 90 g./L.; Na_3PO_4, 30 g./L. Where coatings of paint or enamel are to be applied, or where the parts are to be electroplated with such metals as nickel or copper or chromium, the protective metal film is usually stripped before these coatings are applied, to assure intimate adhesion to the basis metal.

Unless there is some particular reason for the removal of this protective film, it should be allowed to remain on the work. There are no harmful effects—on the contrary, as pointed out in connection with the manufacture of bumper bars, this protective film performs the useful service of eliminating or greatly retarding rusting of steel and iron parts during the interval between the descaling of the work and subsequent fabrication. The protective metal film, while being dense and adherent, is extremely thin. It is very effective, however, in protecting machine parts such as gears, cams, etc., from rust-pitting under ordinary conditions of storage. In other words, the "shelf life" of steel parts is indefinitely prolonged by reason of this protective film. Hot-dip coatings can be applied directly to these protective metal-film-coated articles with marked success.

Energy Generated in Testing Diesel Engines Is Converted Into Heat and Dissipated Into the Air

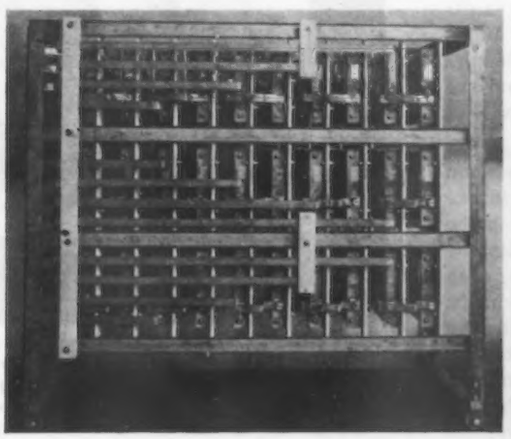
DIESEL engines used for driving streamlined passenger trains and naval vessels, as well as for other services, are subjected to long and rigid tests of various kinds before the motive power unit consisting of engine and generator leaves the factory in which it is built. In operating these units on test blocks a large amount of electrical energy is developed which must be dissipated, for, because of the intermittent load, it is not practical to use this energy for power, heating or lighting.

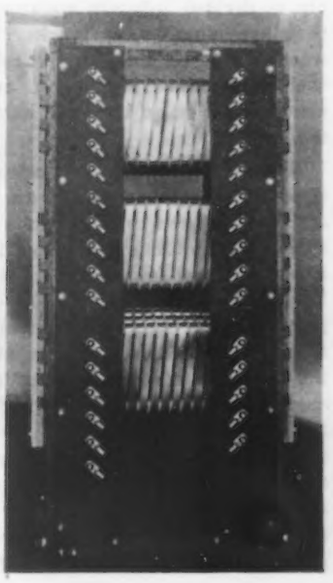
Energy created in test rooms of automobile plants and Diesel engine builders is commonly dissipated through rectangular water boxes. Resistance is regulated by raising and lowering plates in these boxes, which contain salt water, and the energy is converted into heat, which is absorbed by the water and the latter is carried to the sewer or is recirculated after first passing through cooling coils.

A new method of dissipating electrical energy has been installed in the test room of the Winton Engine Corpn., Cleveland builder of Diesel engines. Here the power developed in running the engines under test is dissipated into the air by being converted into heat by nichrome load resistors, the application being similar to that used for creating heat in a resistance-type heating furnace and the heat is dispelled into the air by a blower system. The system was developed by the General Electric Co., which supplied the electrical equipment.

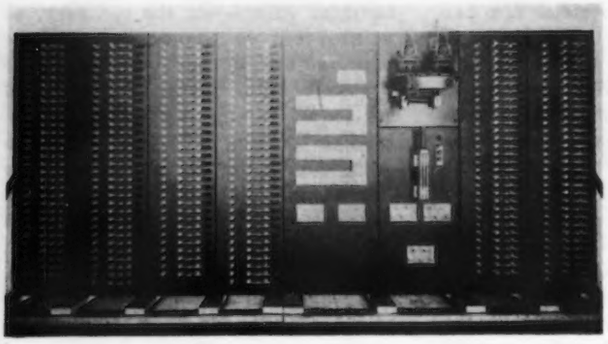
Two new test blocks have been provided, each connected with a switchboard and an electrical unit having capacity for dissipating the current produced in the generator in testing a 1300-hp. Diesel engine. Two engines now being built in the Winton plant for passenger train motive power for the Union Pacific Railroad have a capacity of 1200 hp. each.

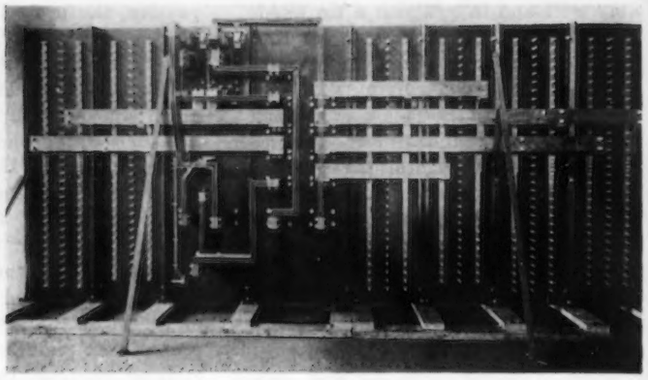
An eight-panel switchboard for each unit connected with the generator of the engine that is being tested is located along the outer wall in front of the test blocks. Each control panel is rated at 1232 kw. and is arranged to control increments of 6.84 kw. for the load resistor. The system is flex-





Front and side view of bank of 30 heaters, each rated 6.84 kw. 110 volts, used as a load resistor. There are 12 of these banks, having a combined capacity of 2462.4 kw.





Each of the two control panels is rated at 12.32 kw. and is arranged to control increments of 6.84 kw. for the load resistor.

ible in that it will handle any current up to three-phase and any voltage up to 990 volts, the switchboard being arranged so that by throwing switches any voltage from 110 to 990 volts may be obtained. The switchboard may be used for testing one large engine or several small ones.

In case of higher than 990 volts, or if 2200 volts a.c. is produced, a transformer is used to step the current down to below 990 volts. If an engine with a d.c. generator is being tested, the load called for on the engine is set through a combination of switches. After the load is set no adjustments are required until the load is changed.

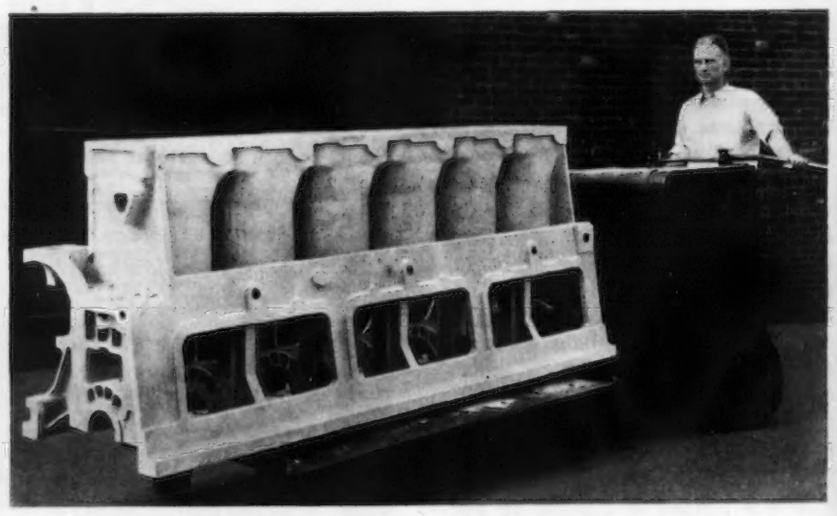
The two nichrome resistor sets to which the current is transmitted have a combined capacity of 2462 kw. Each set consists of 180 units rated 6.84 kw. 110 volts each, arranged in banks of 30 heaters. These are mounted in two rectangular tunnels or ducts of sheet metal construction located on a platform beneath the roof of the test room and above the crane runway. The ducts are 7 ft. 4 in. high, 6 ft. wide and 31 ft. long. Each resistor assembly is divided into six resistor units that are mounted on tracks. When work has to be done on the resistors their connections are broken and the group is pulled on its track outside of the tunnel.

Air is drawn into the duct system from the building through an intake and is exhausted through vents in the side of the building at the roof line by a blower, one for each tunnel, each having a capacity of 15,000 cu. ft. per min. The blower is controlled by a push button. After it is started, the load is turned on by starting the engine under test. Power for driving the blower is supplied by a line from the shop. Should that line fail, an under voltage relay closes the circuit and a siren sounds, which warns the attendant to shut off the engine and generator that are being tested.

Various advantages are claimed for this system of dissipating power produced in engine tests. With this new system it is always possible to maintain positive predetermined loads, while with the water box system of regulating resistance it is said to be impossible to maintain a constant load for an indefinite time.

The new system requires minimum attention, so that test men may give their attention exclusively to the engine tests, and floor room is conserved, as the equipment is located in an overhead space that would otherwise not be utilized. The various factors of efficiency afforded by the new system are claimed to minimize, if not entirely eliminate, the danger of failure of tests. The importance of avoiding these failures is indicated when engines for naval craft are being tested. The Navy Department specifies a continuous testing period of 15 days for Diesel engines and this means that, should it be necessary to shut down the engine at any time during the testing period, the 15-day test must be started all over again.

Sales billed by the General Electric Co. during the first nine months of 1934 amounted to $121,735,123, compared with $97,426,146 during the corresponding period last year, an increase of 25 per cent. Profit available for common stock for the first nine months of this year was $11,714,247, compared with $6,886,600 for the first nine months of last year. This profit is equivalent to 41c. and 24c. a share respectively.



THE Bohn Aluminum & Brass Corpn., Detroit, has made for the Ingersoll-Rand Co. one of the largest aluminum castings ever manufactured. It is for one of the latter's compression-ignition engines, known as a four-cycle Diesel. Ordinarily this casting, comprising the engine frame and water jacketing in one unit, would be made of iron and would weigh well over 3,000 lb. Through the use of aluminum alloy the weight is reduced to 1,640 lb. The metal is a special heat-treated aluminum alloy designed particularly for high-stress service.

Alloys in the Ferrous Foundry

By GOTTFRID OLSON
Foundry Engineer, Wilmette, Ill.

THE general subject of alloys in cast iron as well as the specific advantages of using nickel were described by the author last week. In this, the second and last article, the author considers the action of chromium, molybdenum and tungsten additions to foundry melts. Mr. Olson's discussion concerning the role of these elements is as follows:

For years chromium has been added to cast iron in small quantities to give it certain characteristics. However, not until recent years have quantities larger than 15 to 18 per cent been added.

Chromium has become quite popular as an alloying element, and is now used in small or large quantities in a large number of foundries. It is usually used in a straight chrome-iron mix or in combination with other alloys. In contrast to nickel, chromium is a one-way acting element; it is carbide forming even when used in small percentages and thereby increases hardness. It increases chill and also the strength up to certain limits. It also increases the resistance of iron to heat, wear and most types of corrosion.

In using chromium to give greater strength to cast iron it is well to proceed with caution. The amount to add depends entirely on the base material, i.e., analysis and cupola practice. As in the case of all alloy additions, the base material must be sound as no alloy additions will rectify mistakes.

With good control of the elements, particularly the carbon, up to 0.50 per cent of chromium may be used to give added transverse and tensile strength. Data to support this statement are shown graphically in Fig. 6.

A foundry is often called upon to make one or more castings which have some surfaces chilled. If the regular run of iron is too soft the problem is solved by adding powdered ferrochrome to the ladle.

Small additions usually up to one per cent are often made to the ladle, although as much as three per cent may be absorbed if the iron is hot. Where the tonnage is large or the percentage of chromium high, the addition is made to the charge in the form of briquets. To obtain other physical characteristics, larger percentages of chromium are added, the amount being determined by the type of casting and its intended use.

Chill and hardness run parallel; the deeper the chill the harder the iron and vice versa. The effect of chromium on hardness is illustrated in Fig. 7. In general the lower the hardness number of the base iron the greater the effect of chromium. With 0.50 per cent chromium in two different irons, it has been found that the hardness number in the softer iron has increased 40 points, from 155 to 195, whereas in the harder iron the increase is only 10 points, from 200 to 210. In Fig. 8 is shown how alloy iron, and particularly nickel-chromium iron, develops greater hardness than plain iron when quenched in oil.

The influence of section on the relative hardness of plain and chromium-treated iron is shown in Fig. 9. Solid castings of the step-pulley or telescope type were cast having various dimensions and chrome contents which are shown in Fig. 9. The sections larger than 2½ in. in diameter were cast only of the irons containing no chromium and 0.79 per cent chromium. The presence of 0.48 per cent chromium is not sufficient to prevent softening of section over 2½ in. in diameter.

Chromium favors the formation of more finely laminated and harder pearlite. For this reason it is used in iron where resistance to wear is desired. For best result chromium should be used in combination with nickel, particularly in lighter castings as nickel gives the castings added strength and toughness.

In heavier castings, such as crusher jaws, rolls or balls, a straight chromium-iron mix may be used, although the addition of other alloys such as molybdenum, copper or nickel is often beneficial.

In crusher rolls and other castings requiring machining it is recommended to use soft iron inserts. For example, the soft iron center of a roll is cast separately and inserted in the mold before pouring the roll. The roll can then be poured from iron with any hardness number up to 400 to 600 Brinell. In like manner the provisions for machining other types of castings may be made.

The failure of castings exposed to heat is due to expansion. In foundry parlance it is called growth. The growth of castings may be attributed to one of

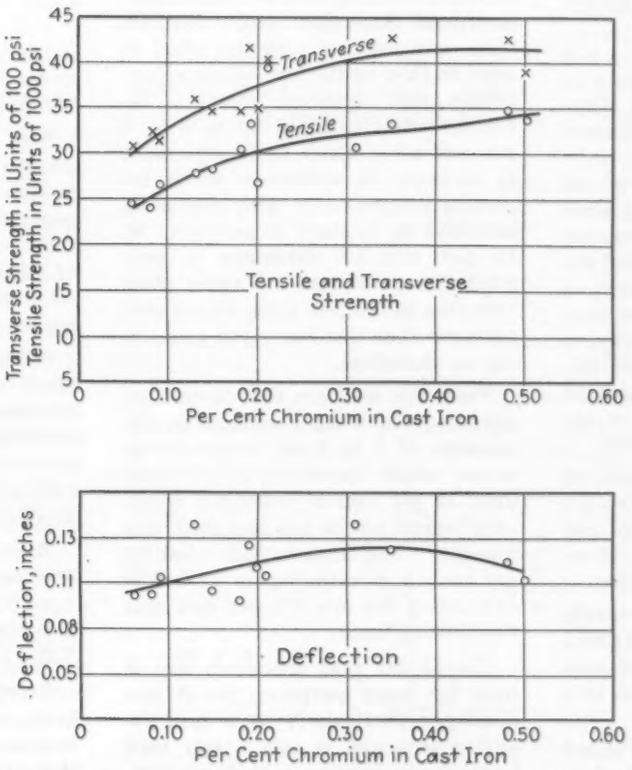


Fig. 6—Tensile and transverse strengths and deflections of cast iron as affected by additions of chromium to the melt.

many causes, although microscopic examination will usually reveal the real cause of the trouble. A chemical analysis gives little information as to why the casting behaves as it does when exposed to heat. Therefore the study of the structure is the only means by which the right diagnosis can be made.

It is a well-known fact that an open iron is not suitable for castings which are to be used at elevated temperatures. This is taken for granted by many without learning why it is true. Analyzing this and in finding an answer to the question of what causes an open iron it might be stated that the direct cause of it is three-fold, namely large grain size, large graphite and occluded gases.

In order to eliminate growth it will therefore be necessary to eliminate its cause. Refining the grain and eliminating large graphite is accomplished by the use of chromium. The problem of occluded gases has not as yet been satisfactorily solved. The number of gases as well as the amount of each is hard to determine, and the ordinary foundry man is content to deal only with oxygen. That is, oxygen combining with other elements such as iron, silicon, manganese, etc. The importance of a well balanced mixture coupled with the best cupola practice cannot be overemphasized.

As to the amount of chromium to add, no formula can be given as the types of heat resisting castings and their uses are too numerous. However, some examples can be given.

There are two types of heat resisting chrome-iron castings; low per cent chromium iron (0.50 to 3.00 per cent Cr.) and high per cent chromium iron (15 per cent or higher).

Enough chromium should be added to prevent the formation of free graphite. Should this make the casting brittle and unsafe to use, certain additions of copper, molybdenum or nickel can be made. The total carbon and silicon should be held low.

For temperatures up to 1400 deg. F., castings with the lower chromium content will be satisfactory in most cases, particularly in view of the lower cost. Where the temperature is higher and castings subjected to intermittent heating and cooling, about 15 per cent chromium should be added. As far as has been learned, there is a range in which no benefit is noted. Chromium up to 0.50 per cent will increase the strength of iron. Between 0.50 and 1.00 it has a tendency to weaken the iron, and this tendency increases progressively although slowly up to three per cent. Between three and five per cent the effect is more marked as the iron becomes very brittle and intensely weak. No further effect is noted up to 8 or 9 per cent after which an improvement in strength is evidenced which increases progressively with chromium additions up to about 10 per cent. At 13 per cent of chromium a very marked improvement has taken place resulting in the iron being 60 per cent stronger than the base iron containing no chromium.

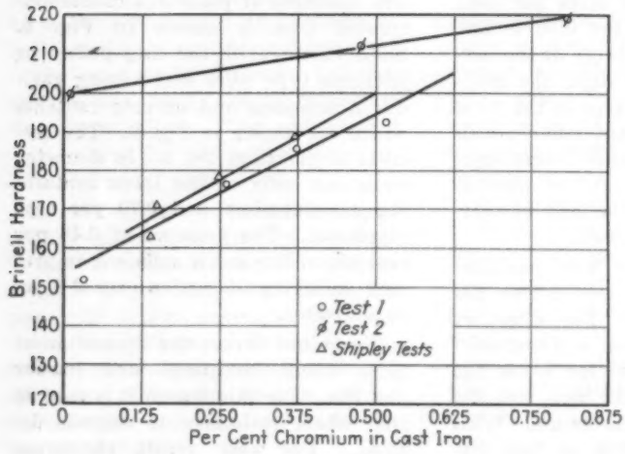


Fig. 7—The hardness of cast iron as affected by alloying additions of chromium.

From this we learn that there is no advantage in using chromium in the amounts of 3 to 9 per cent. As no worth while improvement is noted until 13 per cent is reached it seems only logical not to use less than this amount. The author finds that 15 per cent is a safer figure to use in calculating the mix (15 per cent plus the melting loss).

The 15 per cent chromium iron is used for many purposes, but it was developed particularly as a heat resisting iron and is now widely used by those who have made their acquaintance with this cupola product.

For most purposes cupola-made iron will give satisfactory results. However, where high strength is required together with good heat resisting qualities, an iron lower in carbon than is possible to obtain in the cupola must be resorted to. For high strength heat resisting iron (1400 to 1800 deg. F.) the carbon should be held below 2.50 per cent. Such iron may be produced in the ordinary air furnace or in an electric furnace. The fine structure of electric furnace chrome iron is shown in Fig. 10. The carbon in this iron is quite low, and the fine structure comes from the chromium addition and electric melting. For smaller quantities the gas or oil fired crucible type furnace has served very well and is economical enough for this type of iron.

Before proceeding with the production of high chromium castings for heat resisting purposes, tests were made to determine the effect of high temperature on castings, both plain and chromium-treated. An abbreviated report follows:

Four bars of iron were selected for the purpose, the first cupola-produced white chromium alloy, the second a white iron chromium alloy melted in a crucible, the third a normal gray iron and the fourth a white iron (unannealed malleable) melted in an air furnace. These shall hereafter be referred to as Nos. 1, 2, 3 and 4.

Analyses were as follows:

(Per Cent)

	No. 1	No. 2	No. 3	No. 4
Silicon	1.56	1.48	2.45	1.02
Carbon ...	3.60	3.97	3.42	2.41
Chromium..	8.34	13.69	Nil	Nil

The bars were all disk ground to remove foreign matter and subsequently weighed accurately. Following this the bars were subjected to forty one hour heats at a temperature of 1400 deg. F. About 15 min. were allowed between heats to allow for a cooling to approximately 300 deg. F.

After the above heats the bars were again measured and weighed as before and subjected to twenty one hour heats at 1800 deg. F., with 20 min. intervening between heats to allow for cooling. The bars were again measured and weighed.

All of the tests were made in a gas fired semi-muffle heat treating furnace equipped with a thermocouple and indicator. The results are shown in Table 2 and Fig. 11.

Referring to the figures (Table 2) taken after the 1400 deg. treatment, it is seen that the two chromium alloy bars (Nos. 1 and 2) lost or gained little weight due to oxidation as com-

pared with the gray iron (No. 3) and white iron (No. 4). The increase in weight as reported is due to the formation of scale which adhered so tightly that it was impossible to remove it by mechanical means.

In regard to growth it is seen that the gray iron bar (No. 3) increased approximately ten times as much as the chromium alloyed bar (No. 2) whereas at this temperature the No. 1 bar showed no growth.

Now referring to figures taken after the 1800 deg. treatment there is a somewhat different picture. All of the bars show a loss of weight due to oxidation, the chrome alloy (No. 1) and white iron (No. 4) being the worst since they lost a third of their original weight as compared with the chrome alloy (No. 2) iron which only lost 3 per cent. The gray iron (No. 3) lost 15 per cent of its weight and grew to an extent of 4 per cent.

From the foregoing it is evident that both of the chrome alloys stood up well at a temperature of 1400 deg. At temperatures of 1800 deg. the 14 per cent chrome iron (the two mixtures were figured at 9 and 14 per cent chromium) stood up remarkably well but the 9 per cent chrome iron was no better than white iron as both lost about 33 per cent. The loss on the gray iron bar was approximately 15 per cent.

In analyzing the figures a phenomenon that may at first appear puzzling can be noticed. All the bars had a loss in weight but only bars Nos. 1 and 4 had decreases in length, whereas bars Nos. 2 and 3 increased in length. This is due to the different degree of oxidation and subsequent scaling or peeling.

Actual illustrations of the ability of chrome to reduce scaling and growth are shown in Fig. 12.

As stated before, any cast iron with more than 3 and less than 13 to 15 per cent of chromium becomes weak and brittle and almost useless at temperatures over 1400 deg. The amount of total carbon is also an important factor as the following transverse test shows:

Total Carbon, Per Cent	Chromium, Per Cent	Lb. per Sq. In. A 12 In. Center
2.40	13	3680
3.82	9	1500
4.12	9	1300

When pouring high-chrome castings considerable care must be exercised in gating and pouring. For castings having heavy sections it is necessary to provide large shrink heads. All sharp corners and pockets should be avoided. The metal flows easily, but owing to its characteristic

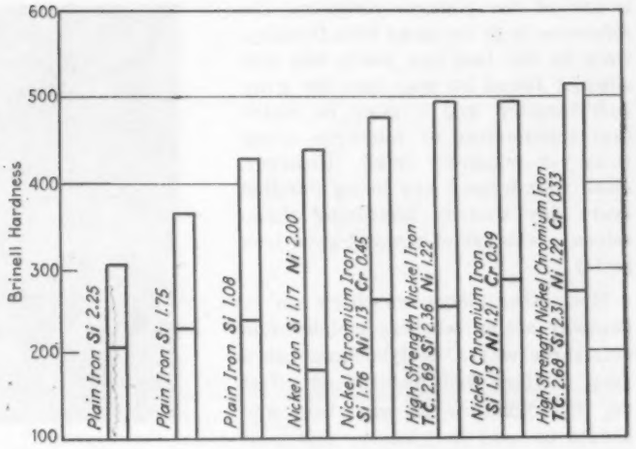

Brinell Hardness
600
500
400
300
200
100
Plain Iron Si 2.25
Plain Iron Si 1.75
Plain Iron Si 1.08
Nickel Iron Si 1.17 Ni 2.00
Nickel Chromium Iron Si 1.76 Ni 1.13 Cr 0.45
High Strength Nickel Iron T.C. 2.69 Si 2.36 Ni 1.22
Nickel Chromium Iron Si 1.13 Ni 1.21 Cr 0.39
High Strength Nickel Chromium Iron T.C. 2.68 Si 2.31 Ni 1.22 Cr 0.33

Fig. 8—Graphic representation that alloy iron and particularly nickel chromium irons develop greater hardness than plain iron when quenched in oil. Lower divisions of each column represent the hardness of the "cast" condition.

of being "sticky" the moulder or pourer, before getting acquainted with this iron, will cause many missruns. The metal in flowing over the lip of the ladle has a tendency to spread out into a thin tape or sheet instead of a solid stream. This causes the pourer to hold back in pouring and the result will be a scrap casting.

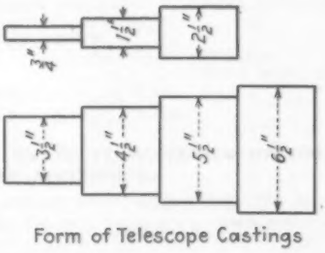
High-chrome metal has a hue of orange or orange-red thereby giving rise to the belief that the iron is dull and lacking fluidity. This fear will, however, be dispelled after it is found that castings turn out sound although the iron appeared "cold".

Chromium is added to the charge in the form of briquets and should be placed in the center of the cupola.

Molybdenum Influence Described

Molybdenum is one of the younger members in the alloy family. As has been the case with the other alloys, molybdenum was first used to give certain properties to steel. It was found that by the addition of small percentages steel became harder and stronger. The material also became tough which was considered a decided advantage. Articles manufactured from rolled or fabricated steel could be made considerably lighter in weight, and the author recalls the first shipment of foundry shovels made from molybdenum steel some twenty or more years ago. Every shovel bore a red label on which was printed the word MOLYBDENUM, and the lightness and the improved design of the shovels caused something of a sensation. There seemed to be some magic in this word molybdenum; every man in the shop wanted "molybdenum" when a new shovel was required. Few knew what the word stood for, but every man was through with the old style shovel.

When it is said that molybdenum



Form of Telescope Castings

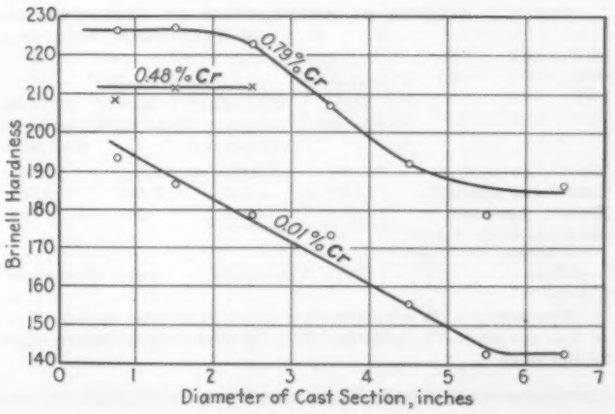


Fig. 9—The influence of chromium in cast iron on the hardness of sections having various thicknesses. The 48 per cent chromium iron softens for sections over 2.5 in. in diameter.

is one of the younger members, the reference is to the gray iron foundry. Only in the last few years has this adjunct found its way into the gray iron foundry, and it must be stated that the number of foundries using it is yet relatively small. However, more foundrymen are being enrolled every day thereby improving themselves in the art of making good iron better.

Most other alloys are either one or two-way acting whereas molybdenum acts three ways. Molybdenum has a very distinct and pronounced effect on the structure of cast iron and should be used judiciously. For most purposes additions of from 0.35 to 0.80 per cent are made.

The effect of molybdenum may be summed up as follows:

Fig. 10—The fine structure of electric furnace chrome iron. Analysis is carbon 1.60, silicon 1.20, manganese 0.31, chromium 24.70. The tensile strength of this iron is 74,000 lb. per sq. in., and the hardness is 363 Brinell. At 100 diameters.

(1) Molybdenum increases the tensile strength 20 to 40 per cent.

(2) Molybdenum increases the transverse strength 25 to 40 per cent.

(3) Molybdenum increases the fatigue strength approximately 25 per cent.

(4) Molybdenum increases the impact strength 50 to 100 per cent.

(5) Molybdenum increases the Brinell hardness 10 to 50 numbers but improves machineability for the same hardness number.

(6) Molybdenum increases the resistance to abrasion and wear.

The variation of above figures depends on the type of base metal used.

The most outstanding characteristics of good gray iron castings are strength and machineability. The effect of molybdenum in this connection is illustrated in Table 3.

The examples in Table 4 show the effects of molybdenum on various base irons, from very poor to very good. These are all strictly comparative tests and no improvement in the base was made in order to show better properties as the result of molybdenum additions.

It should be remembered that no two cupolas produce exactly the same quality iron, even when chemical analyses are similar. There are so many factors affecting the product that they will seldom all be duplicated at any one time, in different shops.

The chart in Fig. 13 illustrates the great uniformity of iron throughout a large section achieved by a molybdenum addition.

It has already been stated the molybdenum has a triple action on cast iron in that it affects directly or indirectly its three principal components. These effects are:

(1) A modification of the size, shape and distribution of the graphite particles, which are smaller, more rounded or curved and more uniformly distributed throughout the structure than in simple iron. Large interfering flakes are completely absent. This is shown by the microphotos in Fig. 14.

(2) A strengthening of the ferrite or carbonless portion of the iron structure due to the solution of molybdenum in ferrite.

(3) A further strengthening of the metallic matrix, since the complex carbides which are also formed are stronger and better disseminated in it than are normal carbides. The complex molybdenum-iron-manganese carbides result in a finely divided feathery pearlite tending to be sorbitic, more stable, more uniformly dis-

TABLE 2—GROWTH TESTS ON GRAY AND CHROMIUM CAST IRONS

	No. 1 Cupola Cr. Iron	No. 2 Crucible Cr. Iron	No. 3 Cupola Gray Iron	No. 4 White Malleable
Original weight	418.645 gm.	396.455 gm.	397.820 gm.	355.045 gm.
Weight after 40 heats at 1400 deg. F.	418.480 gm.	396.990 gm.	401.005 gm.	343.960 gm.
Weight after 20 additional heats at 1800 deg. F.	278.550 gm.	384.120 gm.	346.950 gm.	236.800 gm.
Original length	3.15 in.	3.15 in.	3.15 in.	3.08 in
Length after 40 heats at 1400 deg. F.	3.15 in.	3.155 in.	3.196 in.	3.076 in.
Length after 20 additional heats at 1800 deg. F.	2.98 in.	3.154 in.	3.275 in.	2.91 in.

TABLE SHOWING INCREASES (+) OR DECREASES (—) IN WEIGHTS AND LENGTHS FROM ORIGINAL AFTER TREATMENT AT 1400 AND 1800 DEG. F.

Change in weight after 1400 deg. F.	—0.165 gm.	—0.535 gm.	—3.185 gm.	—11.085 gm.
Per cent	—0.04	—0.133	—0.81	—3.13
Change in weight after 1800 deg. F.	—140.095 gm.	—12.335 gm.	—50.870 gm.	—118.245 gm.
Per cent	—33.6	—3.1	—14.8	—33.2
Change in length after 1400 deg. F.	nil	—0.005 in.	—0.046 in.	—0.004 in.
Per cent	nil	—0.016	—0.15	—0.013
Change in length after 1800 deg. F.	—0.17 in.	—0.004 in.	—0.125 in.	—0.17 in.
Per cent	—5.4	—0.013	—4.0	—5.5

LOSS DUE TO OXIDATION, IN GRAMS PER SQUARE CENTIMETER OF ORIGINAL AREA

No. 1	No. 2	No. 3	No. 4
1.49 gm.	0.128 gm.	0.54 gm.	1.42 gm.

TABLE 3—EFFECTS OF MOLYBDENUM ON STRENGTH AND MACHINEABILITY OF GRAY IRON

	Cylinder Iron					
	Without Molybdenum	With Molybdenum 0.35 per cent	Without Molybdenum	With Molybdenum 0.80 per cent	Without Molybdenum	With Molybdenum 1 per cent
Tensile strength	29,000	38,000	28,000	41,000	40,000	56,000
Transverse strength	3,500	4,400	3,300	4,700	4,800	6,400
Brinell hardness	198	208	201	213	235	285
Machineability rating according to type of iron	Good	Very Good	Good	Very Good	Good	Good

This iron is a 70 per cent steel mix with a total carbon of 2.87 per cent and a silicon of 2.59 per cent. The addition of 0.50 per cent molybdenum increases the tensile strength 26 per cent.

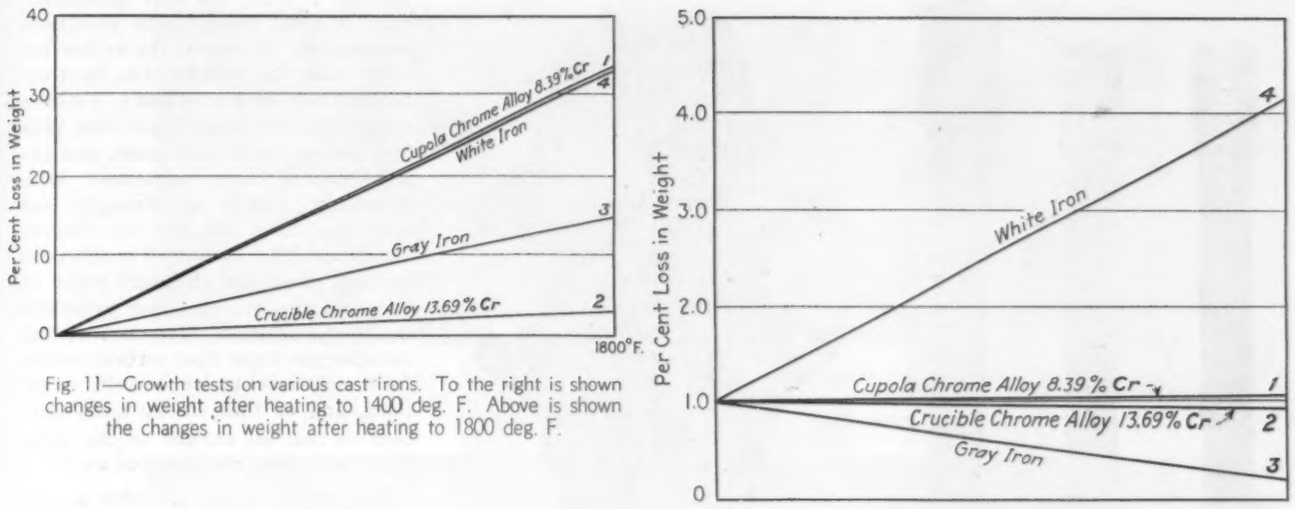


Fig. 11—Growth tests on various cast irons. To the right is shown changes in weight after heating to 1400 deg. F. Above is shown the changes in weight after heating to 1800 deg. F.

tributed and covering a large portion of the whole area than do the carbides in an unalloyed iron. When the specimens are etched with very dilute acid the ferrite and the carbides can be easily differentiated.

"Moly" Improves Wear Resistance

Molybdenum alloyed iron wears better than plain iron. This is due partly to its tendency of producing finer grain and greater uniformity throughout the casting, also to the inherent toughness of the iron.

For chilled work molybdenum has been found to give exceptionally good results. Both hardness and depth of chill increases and the division line between the white and the gray parts is less marked. The chill "runs out" into the gray portion of the casting. Molybdenum has little or no effect on the chill when used in moderate percentages in irons with silicon 2 per cent or higher.

A consistent hardness of around 600 Brinell is obtainable on the chilled surface, using a white iron base. For this type of casting it is recommended to use a molybdenum-chromium iron when wear is the controlling factor, and molybdenum-nickel iron when the impact strength becomes important.

Molybdenum is added to the ladle in the form of ground ferro-molybdenum containing approximately 65 per cent molybdenum, 30 per cent iron and 5 per cent silicon.

The average gray iron founder has, no doubt, overlooked the importance of tungsten in his product. The tool manufacturer and the machinist has long known of the revolutionary effect of this element. Cost of machining has been cut and replacement of tools decreased, and a tremendous speed in production is obtained by the use of tungsten steel tools.

TABLE 4—EFFECT OF MOLYBDENUM ON VARIOUS BASE IRONS

Poor Base Iron No. 1

The following comparative test was obtained on tensile bars cut from similar positions in 9-in. castings. Molybdenum was added to the ladle after the unalloyed iron was tapped. The iron was made in a cupola.

Designation	Total Carbon Per Cent	Combined Carbon Per Cent	Graphite Per Cent	Si. Per Cent	Mn. Per Cent	S. Per Cent	P. Per Cent	Mo. Per Cent	Tensile Strength
"A"	3.60	0.57	3.03	1.40	0.56	0.11	0.22	...	17,820
"B"	3.51	0.85	2.66	1.24	0.62	0.09	0.21	0.47	29,370

Poor Base Iron No. 2

The following results were obtained from arbitration bars (cast from the same cupola mix), in another foundry, and show the effect of a molybdenum addition.

Designation	Total Carbon Per Cent	Combined Carbon Per Cent	Graphite Per Cent	Si. Per Cent	Mn. Per Cent	S. Per Cent	P. Per Cent	Mo. Per Cent	Cr. Per Cent	Ni. Per Cent
Plain	3.70	0.68	3.03	1.82	0.79	0.098	0.13	...	0.26	0.23
"Moly"	3.67	0.70	2.97	1.96	0.76	0.084	0.14	0.43	0.30	0.24

Physical Properties

	On 12 In. Centers Transverse, Lb.	Deflection, In.	Tensile Strength, P.S.I.	Brinell
Plain	3,430	0.084	25,960	190
"Moly"	3,575	0.088	34,100	205

Good Cupola Iron

The figures below describe again a strictly comparative test. The base is better than those shown above and, as can be seen, the improvement is more pronounced.

Designation	Total Carbon Per Cent	Combined Carbon Per Cent	Graphite Per Cent	Mn. Per Cent	Si. Per Cent	S. Per Cent	P. Per Cent	Mo. Per Cent	Ni. Per Cent	Cr. Per Cent
Chromium	3.09	0.63	2.46	0.55	2.24	0.042	0.33	...	0.05	0.26
Chrome-Moly	3.07	0.73	2.34	0.55	2.22	0.042	0.35	0.40	0.02	0.26

Physical Properties

	On 12-In. Centers Transverse Strength Lbs.	Deflection In.	Brinell
Chromium	3670	0.12	223
Chrome-Moly	4860	0.13	235

Note the large increase in transverse strength with an increase in deflection despite a slightly higher Brinell. The "chrome-moly" iron has a 47,080 lb. tensile.

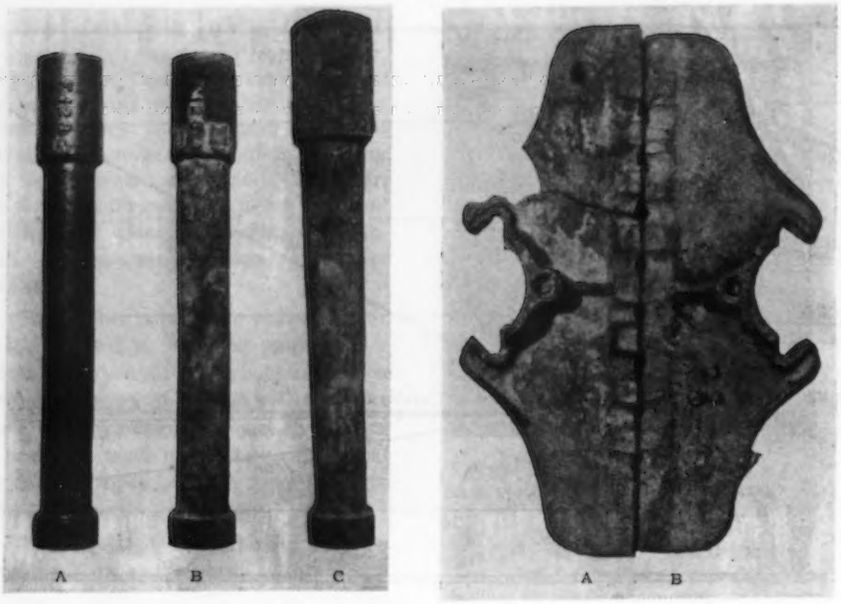


Fig. 12—The growth resistance of cast iron. To the left are protecting tubes for thermocouples used in annealing furnaces. Temperature up to 1825 deg. F. (a) a new tube of 15 per cent chrome iron, (b) a 15 per cent chrome iron tube after several months' service which shows no scaling or growth, and (c) a hard iron casting showing extreme growth (1¼ in.). To the right are two stoker links made from the same pattern. At (a) is shown a high test gray iron, and (b) is a 15 per cent chrome iron. Both heated to 2000 deg. F. The high test iron grew 5/16 in. whereas the chrome iron was unaffected.

The question may be asked "what has this to do with the making of castings." By analyzing it is found that due to some certain characteristics of the tool steel better results are obtainable. One of these characteristics is strength and another is hardness. Knowing this why could it not be used to impart these qualities to gray iron?

A small percentage of tungsen will produce a dense structure and it materially improves the strength, both transverse and tensile. By adding copper the toughness can be increased. By adding still another alloying element, chromium, a product is produced that is outstanding in its serviceableness.

For castings to be used in smelting works, die casting plants, glass works, etc., ordinary cast iron has been found not to stand up. Some modifications as to composition have been made with results ranging from fairly good to negative or in some cases even detrimental.

A casting such as a melting or holding pot for aluminum is subjected to at least two disturbing and destroying actions. One is the high temperature on the outside caused by the flame and the other is what is believed by many to be a chemical reaction set up by the molten aluminum.

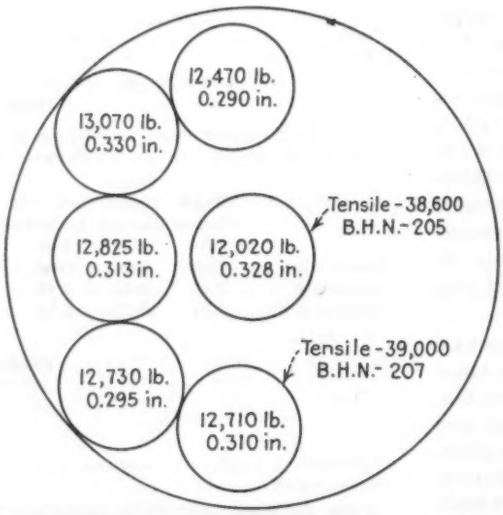
Tungsten Iron Withholds Cutting

It is quite obvious that one requisite of the iron used for this purpose is that of being heat resisting. To produce a heat-resisting iron is no longer a problem, and this has been thoroughly covered in preceding paragraphs. The second question or problem, that of keeping the pot from "burning out," is the one that has given investigators the greatest concern. As to the cause of the trouble, many versions are given. Some say that the pot is "eaten away," others say it burns away, whereas some claim it to be a chemical action The last mentioned "cause" is, in the writer's opinion, the most widely accepted and the one that should be given serious attention. It is an idea that "goes over" with a great many, both producers and buyers. However, the author believes that the problem has been attacked from the wrong angle. We have worked on the theory that iron goes into solution with aluminum, and the phenomenon being associated with chemistry, rightly or wrongly, has been considered one for the chemist to explain. We have tried to solve the problem from the chemist's point of view, leaving out all other probabilities for a solution. The chemist and metallurgist know that certain metals form solutions under certain conditions, and on that theory many proceed to find an answer to the question, "why does the pot give out?"

The author wishes to offer a suggestion to those interested in the solution of this problem. The suggestion being based on results obtained using certain alloying elements in the production of this type of castings.

The aforementioned chemical reaction is, in the author's opinion, negligible. The effect is rather due to a mechanical action. The aluminum molecules traveling at great speed, due to the high temperature of the bath, strike the surface of the iron pot. The aluminum molecules strike the iron crystals which at this temperature (1400 deg. F.) undergo a transition from the A_3 to A_2 state. This has a disintegrating effect on the iron crystals. The temperature figure of 1400 deg. is given, although the critical point may be found anywhere between 1300 and 1600 deg., depending on the composition.

The solution seems to be the finding of an iron whose composition is such that it will render the iron stable



Separately Cast Bar	
Load	13,070
Deflection	0.214
Brinell	238
Carbon	3.05
Silicon	1.22
Sulphur	0.09
Manganese	1.16
Phosphorus	0.30
Molybdenum	0.90
Vanadium	0.06
Nickel	0.03
Chromium	0.03

Load and Deflection of Bars Milled from 10 in. Diameter 2.20 in. Bars - 24 in. Span

Fig. 13—Molybdenum iron showing a great uniformity of tensile strength and Brinell hardness from center to edge of a 10-in. section. The "openness of grain" usual in the center of heavy castings has been eliminated as the result of a molybdenum addition.

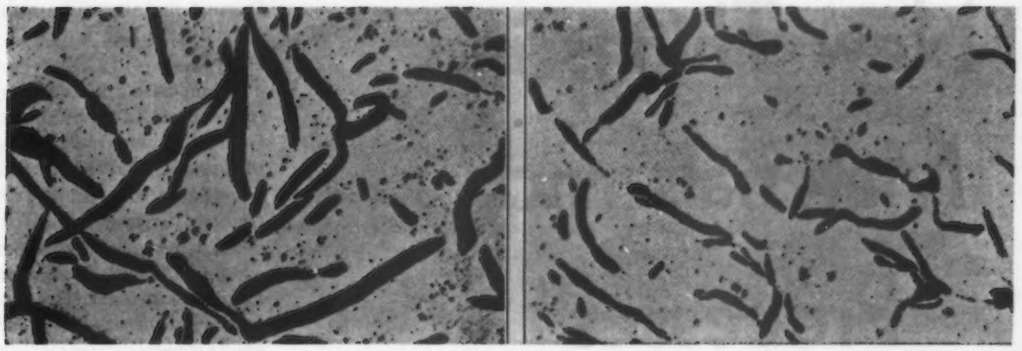
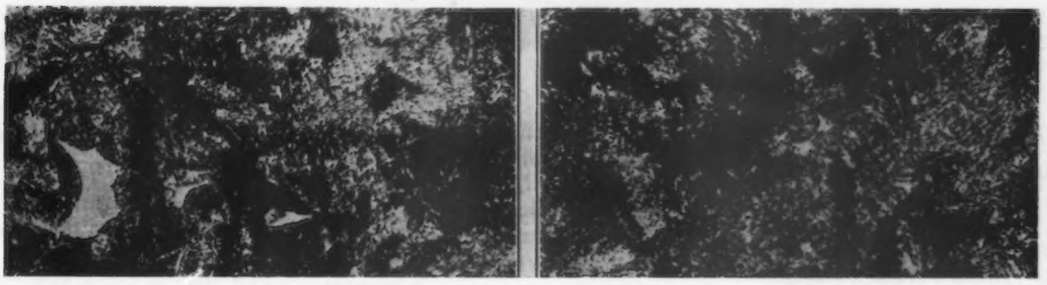


Fig. 14—The views above show the remarkable improvement in graphite size and distribution as affected by a molybdenum addition. To the left is a plain cast iron and to the right a molybdenum cast iron. Below, to the left, is a chrome iron and to the right is shown a chrome-molybdenum iron.



at temperature at which the pot is kept. Homogeneity of the iron is likewise of great importance. A solid and very dense iron will withstand the hammering action of the molecules better than one that is spongy.

An iron containing from 1 to 3 per cent chromium, about 2 per cent copper and from ¼ to 1 per cent tungsten has been found to give an exceedingly close iron, and one that will withstand this action of cutting or eating out of the iron.

Chromium may be added to the charge or in the form of ferro-chrome to the ladle, copper is added to the ladle and for the present the best method of adding tungsten is to use butts of tungsten tools. These butts are weighed up accurately and dropped into a chill mold where hot iron has been poured, or they may be deposited in the ladle while iron is being tapped. After the tungsten scrap has dissolved completely the iron is poured into chill molds and the pigs are weighed and the composition calculated. Pigs made either way may be used in the regular charge.

The tungsten tools used for this usually contain approximately 18 per cent tungsten and 6 per cent chromium.

Automobile Design Changes to be Gradual

CHANGES in passenger car design in the near future probably will be only gradual, said Henry M. Crane, technical assistant to the president, General Motors Corpn., in addressing a meeting of the Metropolitan section of the Society of Automotive Engineers in New York, Oct. 8.

Mr. Crane, a past president of the society, spoke as a member, making it clear that the opinions he expressed were not necessarily those of the corporation with which he is affiliated. He does not anticipate radical changes in engine design, such as the adoption of a new cycle, in the near future, and indicated that there is now no need for more than eight cylinders, at least in large-production models. Transmission, he believes, is now quite satisfactory and no early change to radically new types is indicated. Power shifting would be quite easily accomplished with current synchromesh types but so little gear shifting is required that the extra complication is of doubtful value. Overdrive yields some advantages in the case of cars driven much at high speed in open country, but sometimes interferes with manouverability, particularly when passing other cars, the speaker said. Some changes in springing at the rear may be undertaken, but the current arrangement of leaf springs in the rear is quite satisfactory for most road and driving conditions. Front suspensions, of the independent type, he indicated, have proved their worth, especially in fast driving on poor roads, but have increased cost of production. He anticipates little change in current types in the near future.

Streamlining, as a name and as affecting appearance, Mr. Crane indicated, had gained public acceptance and is likely to be continued, but its effectiveness in present forms, as regards power and fuel saving has been over-rated. Really effective streamlining involves marked rearrangement of body and chassis, he said, and appeared to question whether such changes would be worthwhile, especially as they may involve a narrow rear seat which would not be acceptable to most purchasers of cars made in large quantities.

Improvements in brakes have not kept pace with speed increase and much must be done to effect needed changes, though radical departures seem unlikely, in Mr. Crane's view. Wider use of cast iron drums is anticipated and much is being done to assure uniformity of brake action under varying weather conditions. Employment of brakes making use of power application may be expected to increase.

Some speakers discussing Mr. Crane's remarks pointed out that streamlining does not necessarily increase car length and that tests of well streamlined cars have shown them decidedly effective in power and fuel saving, even at speed of only 40 m.p.h. Some streamlining on front, top and rear of production models has been good, but fenders and running boards still create eddying at the sides of these vehicles, it was pointed out.

New Things in Materials and Processes

By EDWIN F. CONE

New Alloys of Beryllium

SOME highly interesting alloys of beryllium and nickel, or nickel and chromium, are soon to be announced as available commercially. According to the Beryllium Products Corpn., New York, one of these alloys—nickel and beryllium—can be tempered by precipitation hardening so that it has a tensile strength of 259,000 lb. per sq. in., with a yield point of 219,000 lb. per sq. in., and an elongation of 8 per cent. Its Brinell hardness is then 460.

Another alloy of beryllium with both nickel and chromium present has, after age hardening, a tensile strength of 216,000 lb. per sq. in., an elastic limit of 204,000 lb. per sq. in., and an elongation of 11 per cent.

It is stated that both of these alloys possess unusual corrosion-resistance properties with special reference to resistance to mineral acids at temperatures causing intergranular corrosion in some existing materials or alloys. It is pointed out that, since these new alloys must sell at very much higher prices than beryllium-copper alloys, their use may be limited to cases where particular problems of temperature and corrosion occur.

• • •

Research Expansion in Schools

ONE of the interesting and significant tendencies is the extent to which a number of technical schools are purchasing scientific equipment. This is apparently to be used for demonstration and research.

One of the most recent cases in the United States is the Brooklyn Polytechnic Institute, which has installed, along with other apparatus, a 250-lb. Ajax-Northrup high-frequency melting furnace. Then may be mentioned the Technical School of Sao Paulo, Sao Paulo, Brazil, which has lately bought several induction-heating melting and heat-treating units of the high-frequency type, and this in a country hardly conspicuous for metal production or even metal working.

• • •

Heat-Treated Railroad Crossings

A DEVELOPMENT in railroad work, comparatively recent, is the production of rail crossings, not by casting, but by building up or bolting together rails or parts thereof. The rails that are employed, however, are heat-treated by a special process.

The resulting crossing is regarded as superior in many respects and to have markedly attractive physical properties. A comparison of the characteristics of the untreated and treated rails is as follows:

	Standard Rail	Heat-Treated Rail
Elastic limit, lb. per sq. in.	83,000	126,700
Tensile strength, lb. per sq. in.	137,800	177,400
Elongation, per cent	8.8	7.7
Reduction of area, per cent	12.1	11.7
Brinell hardness	282	361
Izod impact, ft.-lb.	2	7

The heat treatment, details of which are not forthcoming, raises not only the tensile strength and elastic limit, but more particularly the hardness and impact value. These last two enhanced qualities are of prime importance in the service of rails.

• • •

Cleansing and Desulphurizing with Sodium Carbonate

ACCORDING to experience in England, sodium carbonate is a successful reagent in cleansing and desulphurizing cast iron and some non-ferrous metals. The anhydrous form of the familiar washing soda is employed.

When used in cast iron, it is placed in the forehearth of the cupola in such foundries where mass production is practised. The metal is poured from a teapot-type of ladle into which it is tapped. It is drawn from the bottom of this by a syphon effect in order to secure efficient separation of the flux from the metal. Because of the degasifying effect of the sodium carbonate, shrinkage cracks and gas holes are claimed to be largely eliminated. The sulphur content is reduced and a more machinable casting is obtained.

The process is claimed to be equally as beneficial to brass and bronze castings.

• • •

German Experience in Jolting Ingots

SOME experiments have been made in Germany on the effect of jolting steel ingots as they are solidifying. This idea is not a new one, a patent on this having been granted as early as 1889. Since then there have been many experiments.

In some recent tests at a German steel plant, some 3-ton ingots were jolted in a machine which raised and lowered the ingot molds through a height of 22 mm. (⅞ in.) as often as four times a second.

According to *Stahl und Eisen*, in the case of rimming steel, excessive segregation is caused if the jolting be done too soon after pouring. This was avoided by delaying the jolting for one-half to three-fourths of an hour after teeming; beyond this time the operation had little if any effect. Even with killed steel, the shaking operation had to be delayed until the ingot top froze over.

It is admitted that it is too soon to draw conclusions that jolting of the ingots is beneficial. Proponents state that jolting reduces the grain size, while others insist that it causes hot tears or cracks.

• • •

Automatic Inductive Heat Treating

UNDOUBTEDLY one of the coming methods in heat treating is the application of inductive heat, that is, heat which is induced in the material to be heated and which proceeds from the inside of the material to the outside. The most important commercial applications of this principle are the heat treating of razor blade steel and the drying of painted or enameled automobile parts.

Another possible application of inductive heat for heat treating was exhibited by the Ajax Electrothermic Corpn. at the National Metal Exposition in New York in the case of a fully automatic electric induction billet heater. The apparatus operated on a diminutive scale, but revealed its possibilities. It fed ½-in. diameter steel billets 3 in.. long into an induction furnace for heating. A photoelectric relay device was aimed to sight on the pieces as they were heated. This caused them to be ejected at a critical temperature into a quenching bath. The feeding, heating, and quenching operations were made visible to observers. The temperature of the pieces was automatically controlled to within a few degrees at about 2000 deg. F., but higher or lower temperatures were possible by manually setting a control rheostat. The exhibit illustrated the simplicity of this method of heating and control.

• • •

More About Heat Treating Steel Rails

THERE is still no little interest in this country and foreign lands in the subject of heat treating steel rails. Several methods have been proposed by American and Canadian engineers and patented. A recent method in Germany is about as follows:

"This process depends on a sharp and rapid quenching (1 min. from 820 deg. C. to below 200 deg. C.) of the rail head in a stream of flowing water with a view to producing a martensitic structure on the running surface of the rails. Tempering then takes place to a certain extent by heat flowing from the interior of the head to the hardened upper surfaces so that the microstructure approximates more closely to troostite."

Length of immersion is dependent on the carbon content of the steel and on the degree of hardness desired. The Sandberg and the Neuves-Maisons processes are said to produce a sorbitic structure by gentle cooling.

Certain Canadian and other methods suggest "delayed cooling" in the heat treatment.

• • •

Powder Metallurgy Solves a Brass Problem

A CERTAIN brass foundry filled an order for a large number of castings not easy to mold and pour and still obtain a sound product. The composition was 85-5-5-5. I am informed that about 40 per cent of the order had to be rejected for defects which developed on the surface or after machining.

Powder metallurgy was tried as a solution of this problem. It is stated that the resort to this process of mixing the powdered metals in the required percentage, pressing them into the necessary shape and subjecting them to proper temperatures resulted in a substantially perfect product—a triumph for this comparatively new process.

• • •

Paving Blocks of Cast Iron

PAVING made of cast iron blocks is a comparatively new use for this material, at least in this country. They are reported to have won some favor in England, Germany, and France. The application there has been at points where traffic is particularly heavy, as at bus stops, bridge approaches and busy intersections.

Cast iron blocks, square or triangular, may be used extensively in this country, according to a statement by E. W. Davis, director of the School of Mines Experiment Station of the University of Minnesota. That institution has secured permission from the city engineer of Minneapolis to lay an experimental 30-ft. stretch of cast iron blocks at the foot of a hill on a campus street so that their durability, safety, and convenience to traffic can be studied. While more expensive, their durability is claimed to be immeasurably greater than other paving materials.

• • •

Better Steel Castings

A NEW process for producing steel castings has recently been introduced into the United States by one of the leading progressive producers of electric steel castings. It is a German process. It is claimed that castings are being made that cannot be successfully turned out by the best conventional methods of the most up-to-date American foundries. A casting is made which is as nearly perfect as it is possible to produce. Details will be available in the near future.

• • •

Manganese in Open-Hearth Melting

FOR some time it has been recognized as excellent basic open-hearth steel practice to use manganese-bearing pig iron in the charge. The object is to secure the benefit of the action of manganese in the metal during the melting and refining process.

Some German authorities would advocate the use of manganese ore in the charge instead of the 4 to 6 per cent manganese pig iron. They claim that the use of the manganese ore is cheaper and equally as efficient. By using a 50 per cent manganese ore in the charge, enough manganese is reduced to raise the manganese content of the metal in the bath as high as when a 5.6 per cent manganese pig iron is used. The bath should melt down over 1 per cent in carbon to effect this reduction. The more manganese ore the more carbon should be added, they say. This practice results in a 20 per cent saving in charge costs.

Other authorities advocate adding manganese oxide to the slag when ferro-manganese is added to the bath, during the finishing of the heat.

• • •

New Products in Stainless Steel

ONE of the large producers of the stainless steels is now successfully rolling angles of sizes which are capable of being rolled on an 18-in. mill. It is also successfully producing turbine blade sections as well as plates ¼ in. thick and upward.

• • •

Nickel in German Coins

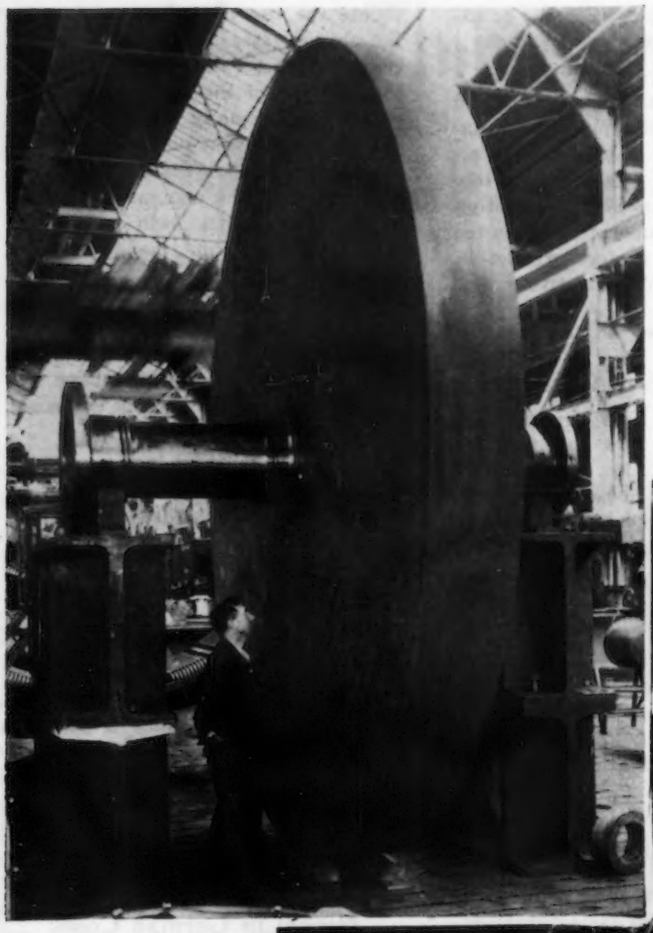
BECAUSE Germany has just issued 1-mark nickel coins and is withdrawing her 1 and 3-mark silver coins, it is estimated that 1200 tons of nickel will be required. The withdrawal of the silver coins, according to estimates, will involve 640 metric tons of silver and 3160 tons of copper. The American "nickel" piece has only about 25 per cent of pure nickel in it, but Germany and some other countries are adding pure nickel to their coinage. New silver coins worth 2 to 5 marks are to be issued also. The old silver coins, being withdrawn, were only 500 fine, but the new 2-mark pieces will be 625 fine and the 5-mark ones 900 fine.

• • •

Experience with Silicon Carbide Bricks

REMARKABLE resistance to scorification of bricks of silicon carbide is emphasized by a recent German author. Refractory bricks containing 85 per cent silicon carbide (SiC) can be made by the use of proper binding materials. Although these bricks are subject to attack by oxidizing gases, favorable results are reported from their use in enameling furnaces whose heating-up time could be cut in two.

Power Unit for Ford Blooming Mill



AT THE LEFT

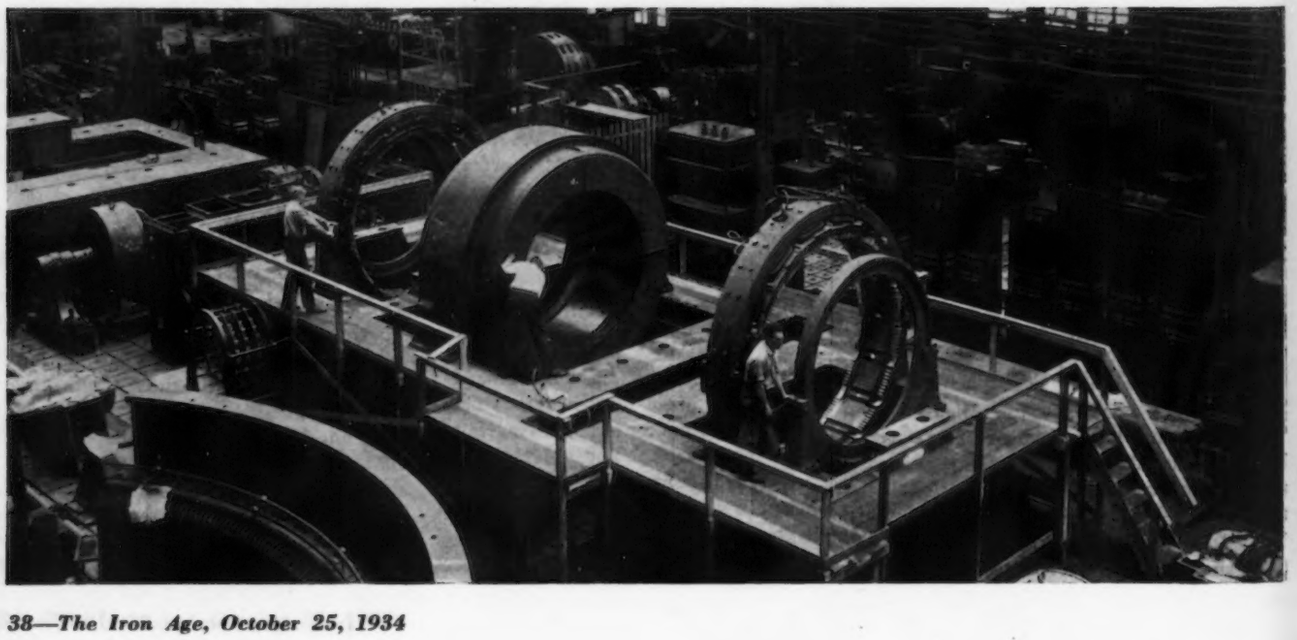
THIS 146,800-lb. flywheel will be installed as a part of the 6000-kw. motor-generator set for the Ford Motor Co. new blooming mill. The fabricating has been done at the Schenectady plant of the General Electric Co., where a complete power set is being built.

BELOW

THE lower half of the magnet frame is shown in process of completion of pole-face windings for the 7000-hp., 750-volt, 50 to 100-r.p.m. reversing motor. The two halves of the frame are made up from four steel slabs, 26 in. wide, 11 in. thick, and nearly 26 ft. long, each weighing approximately 25,000 lb.

BELOW

ASSEMBLY check-up of the set, prior to test run, is shown in this view. The set consists of two 3000-kw., 750-volt generators, a 5000-hp., 13,200-volt induction motor and flywheel.



Added Weight and Rigidity In New Toolroom Miller

THE new No. 12, Van Norman Machine Tool Co., Springfield, Mass., miller pictured on page 40 has been designed to meet modern toolroom and pattern conditions. It retains the adjustable cutter head and movable ram common to all Van Norman millers and is equipped with antifriction bearings throughout. The cutter head is adjustable not only for horizontal and vertical milling, but also for angular settings over a 90-deg. range. It is said that with the sub-head attached to the main head, almost any angular surface can be obtained through the full travel of the table, using a standard right angle cutter. The saddle and table are considerably heavier and the box-type knee and other parts have been stiffened to give this new No. 12 machine greater rigidity than in previous models of equal size. All cutter head drive gears are within the ram, the ram and cutter head forming a unit having no drive connection with other parts of the machine. Standard cutter speeds range from 70 to 1465 r.p.m.; higher speeds are possible. Motor mounting is at the top of the ram; drive to the cutter head gears is by V-belt. The table motor is mounted below the gear box at the back of the machine.

Capacity of Hydraulic Pump Varied by Rotor Width

THE Racine Tool & Machine Company, Racine, Wis., has brought out a new, variable volume hydraulic pump, shown on page 40, which it is said embodies simplified design and sensitive control. Constant pressure of 500 pounds per square inch, with momentary pressures up to 1000 pounds, is available in three sizes of pumps with volume ranges from zero to 2000, 4000 and 6000 cubic inches per minute. The housing or case is the same for all volume sizes. Changes in capacity are obtained by varying the width of pump rotor.

Pumps are of multiple-vane type, having 13 vanes, which when revolved at a constant motor speed of 1200 r.p.m. provide 15,600 impulses per minute.

The volume is controlled from zero to maximum by offsetting the governor ring or pumping chamber mechanically or automatically. Positive control of volume is provided through manual or mechanically operated control lever. Automatic control is provided by a piston type of hydraulic governor which reduces volume automatically a sufficient amount to maintain any desired line pressure. With this device the pump may be operated at full volume until a predetermined pressure is reached; the hydraulic governor then reduces the pumping chamber so that only sufficient oil is pumped to hold the desired line pressure. This feature serves dual purpose, in that it eliminates by-passing of surplus oil with consequent reduction in temperature rise of the oil, and also reduces the horsepower input in direct proportion to the volume of oil pumped. This feature it is said, allows the use of much less oil in the system than with a constant volume pump requiring a relief valve and a large supply of oil in the system to reduce heat developed in by-passing.

The automatic control as described is featured for such applications as: presses, grinders, die-casting machines, planers, chucks, lifts, stokers, broaches and equipment generally operated by hydraulic means.

These pumps are relatively small in size, making possible their installation as built-in units, rather than requiring independent mounting.

There are but seven distinct parts exclusive of the roller bearings, vanes and pump case, all of which are hardened and ground. The design eliminates a central valve shaft, and the rotor assembly is carried by a solid steel shaft on which are mounted needle-roller bearings.

These pumping units are furnished individually or mounted on a base containing the supply of oil for the hydraulic system, and providing space for direct connected electric motor.

Rapid Marking Machine

A NEW model rapid production marking machine, shown on page 40, has been marketed by the Noble & Westbrook Mfg. Co., Hartford, Conn. The machine, it is said, will mark, with a continuous inscription, name, address, trademark, or selected wording, within the range of the marking die, on strip or ribbon stock ¼ in. to 1¼ in. or 2 in. wide and having thickness from 0.025 to 1/16 in.

Motor driving power is through enclosed V-belt to a worm and gear. For feed, pressure and marking there are two rolls geared together; each supplies pressure and, through friction, functions in automatically feeding the stock. The top roll, with provision for interchanging, carries the marking die, while the lower roll is referred to as the pressure roll. An eccentric shaft attached to the upper roll provides adjustment for stock thickness and suitable provision is made for stock-centering. The machine has 2 speeds—125 and 200 ft. per min. of stock feed, and weighs 350 lb.

Glass Fuses With New Alloy

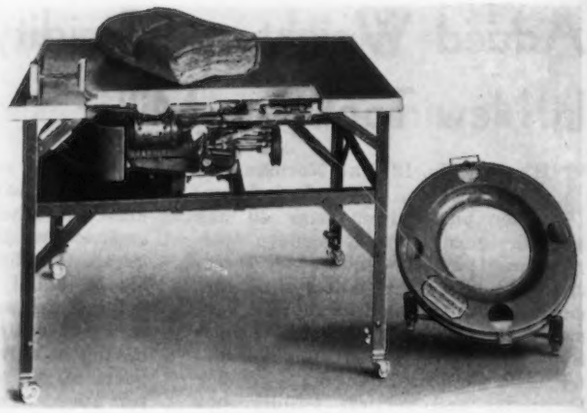
THE alloy "Fernico" shown, fused with glass, on page 40, has a physical characteristic in its expansion curve which coincides almost exactly with the expansion curve of certain glasses. This fact makes possible the successful fusion of Fernico and glass, as the like characteristic eliminates stresses in either the metal or the glass when cooling from the fusion temperature, and thus a sturdy and reliable metal-to-glass seal is said to be secured. Fernico, developed by the General Electric Co., Schenectady, can be machined, forged, punched, drawn, stamped, soldered, copper-brazed and welded with a facility equal to that with which these operations can be performed on a high-grade nickel-iron. It is said that, because of the certainty with which tight and reliable joints can be effected, many possibilities have been opened up, particularly in various classes of vacuum tubes and other devices wherein leading-in wires or conducting parts must pass through gas-tight seals or themselves form a part of a gas-tight chamber.

New Arc Welding Remote Control

A NEW remote control development for use with electric arc welding equipment, the volt-amp. adjuster device, shown on page 40, is manufactured by the Hobart Bros. Co., Troy, Ohio. On page 40 views are shown from both front and rear. When used with the arc welding equipment made by the company the device makes available more than 140 steps, having more than 400 possible combinations of open circuit voltage and welding current. This control device may be located at the machine or at any remote point, from which remote point more than 140 combinations of voltage and welding current are available for each of the machine ranges. Convenient dial-calibration is provided for relocating settings already determined as proper or best for certain jobs.

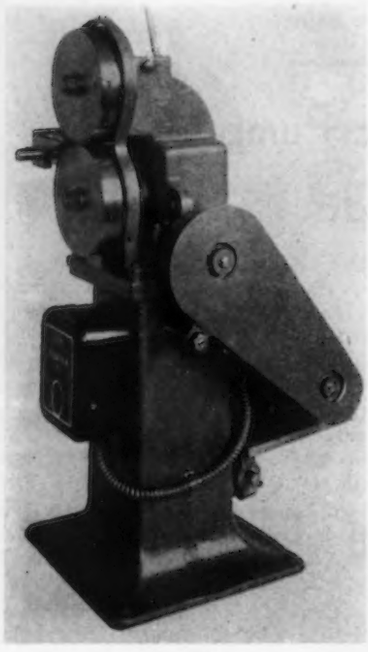
AT LEFT

VARIED angular surfaces are conveniently milled through adjustment provisions embodied in this new Van Norman No. 12 toolroom and pattern miller. Details on page 39.



ABOVE

THIS wire-tying equipment for making containers secure can be rolled to different locations where it may be convenient to "pack," as outlined on page 42.

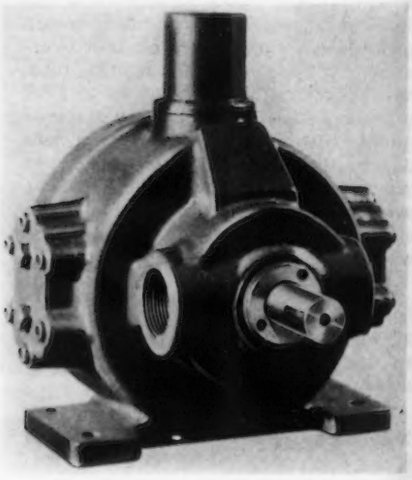


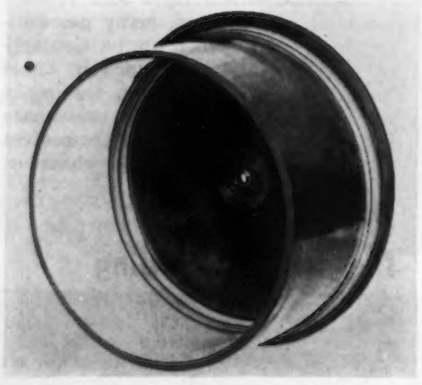
ABOVE

A WIDE variation of continuous-roll inscriptions can be automatically registered on strip or ribbon stock by this marking machine, details of which are given on page 39.

BELOW

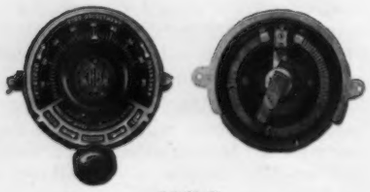
SENSITIVE control is among the features of a hydraulic pump which provides 15,600 impulses per minute at 1200 r.p.m. of motor. Control is described on page 39.





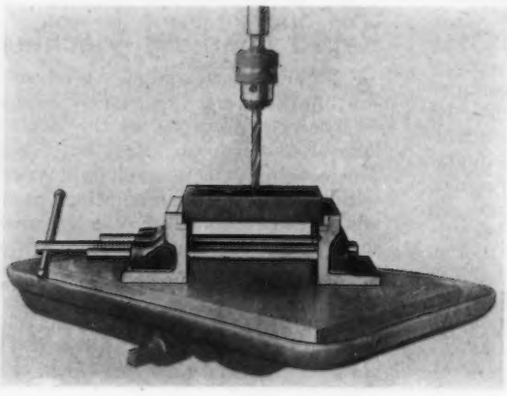
ABOVE

LIKE characteristics of expansion curves are said to eliminate stresses in the cooling of a fused combination of glass with a new metal. Field of applications referred to on page 39.



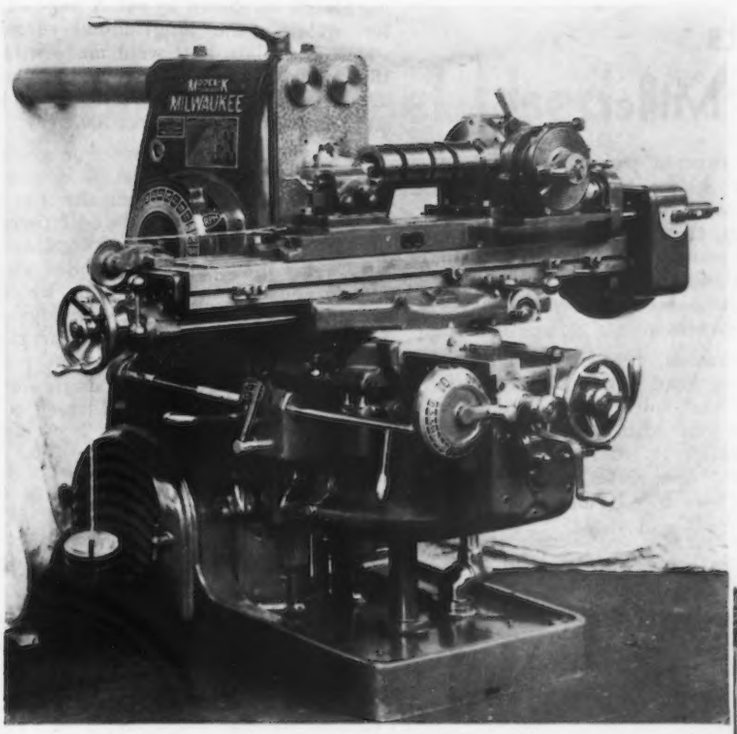
ABOVE

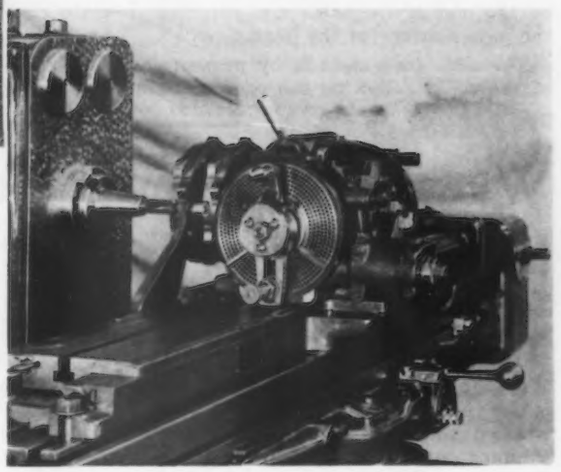
ARC welding control possibilities as engineered for Hobart welding equipment are given somewhat in detail on page 39.



AT LEFT

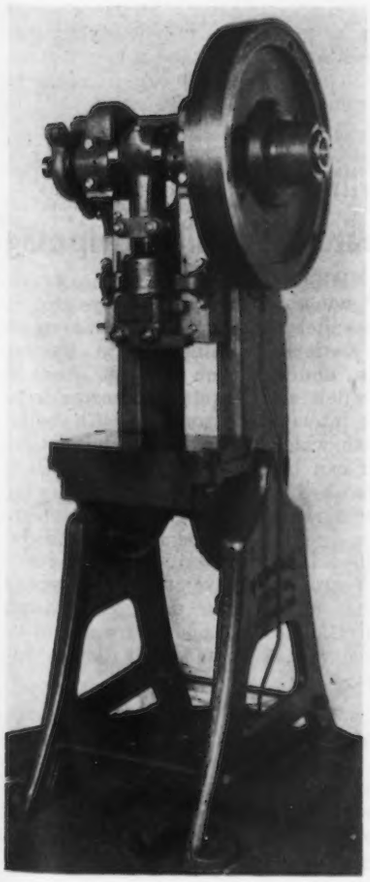
A DRILL-PRESS vise having more than usual vise holding and vise setting possibilities is described in detail on page 42.





ABOVE AND AT RIGHT

DESCRIPTION of equipment and procedure for obtaining a very considerable product-flexibility through the use of devices, standard with this milling machine manufacturer and for use on standard machines, is given on page 42. A close-up view of attachment set-up is here shown in order that the procedure may be clearly followed. See page 42.



AT LEFT

PROTECTION against conditions tending toward "play" in punch-press flywheel mounting or bearing on crankshaft is said to be afforded through new roller bearing installation referred to on page 42.

ABOVE AND AT LEFT

THE replacing of pipe lines with larger diameters for sewage disposal is said to have been unnecessary because of demonstrated anti-friction properties in stainless clad steel. See page 42

Special Slide Unit Converts Standard Miller Into Cam Miller

KEARNEY & TRECKER CORPN., Milwaukee, Wis., have developed a cam milling slide, base and roller-bracket unit which in combination with the dividing head and tailstock furnished with the model K universal milling machine converts the universal into a cam miller.

The slide is arranged so that the dividing head spindle can be set parallel with, or at right angles to, the machine spindle. For milling barrel cams it is set at right angles; for milling face and peripheral cams it is set parallel and a right-angle drive bracket is used to carry the drive from the spiral change-gear unit to the head. The spiral change-gear unit is on the end of the table and supplies the power drive for the head.

The slide movement is by pressure of the roller following the contour of a master cam; a weight attached to the slide holds the roller firmly against the face of the master cam. For set-up, the master cam and the blank are mounted on an arbor which is carried in the dividing head spindle; the suitable roller is carried in the roller-bracket.

For operation, the slide, carrying the dividing head with its shaft connected to the spiral drive unit for power drive, is adjusted to bring the roller parallel to, and in the same plane with, the cutter held in the spindle. There then remains only selection of feed and speed.

A cam rather than a special template can be used as a master, thus avoiding layout and special cutting. The complete attachment weighs 325 lb. Photographs on page 41.

Wire Tying Equipment Housed In Roller Packing Table

THE Model "Q" semi-automatic wire tying machine being offered by The Gerrard Co., Inc., 2915 West Forty-seventh Street, Chicago, is designed for tying all types of corrugated and fiber as well as wooden shipping containers. It is portable and fits compactly into a special steel table. Weight 75 lb. See page 40.

Ties are made at a rate of 20 or more per minute. This includes the operation of draping the wire around the bundle or box and pressing the operating lever. At that pressing the machine grips and tensions the special high tensile tying wire, ties or knots it smoothly under the bundle and cuts it off in a manner that leaves no rough edges for injury to the hands or fingers. Bundles tied by the Model "Q" are acceptable for U.S. mail. Immediately after the tie the automatic mechanism pulls forward the wire from the coil in the container in preparation for the next tie. A minimum of wire is lost in cutting. Tension is adjustable to any size package or container.

The flexibility of the "Q" model enables it to tie all types of bundles or boxes, and its chromium-plated top as well as the smooth cadmium plate of its table facilitates easy handling of the packages in one, two or three-way ties. The machine is operated by a ½-h.p. motor which can be plugged into any convenient power socket.

Use Stainless Clad Steel On Sewage Disposal Job

PLYKROME, the stainless clad steel produced by the Illinois Steel Co., Chicago, has been tested during the past year in connection with the Milwaukee sewage disposal system to determine its ability to reduce the friction of compressed air as it passes through pipe. For the project it was desirable to use a metal which possessed a low coefficient of friction and which at the same time would not be subject to corrosion and, therefore in this case, to a gradual accumulation of scale or dirt over a period of years. It is said that Plykrome has met the requirements. For the installation, ¼-in. Plykrome, with an inside stainless veneer of USS 18-8 stainless steel, is used. Fabrication is by the Cream City Boiler Co., Milwaukee. The shell is constructed in approximately 54-ft. long sections, ranging in diameter from 24-in. to 48-in. and (very largely) 5-ft. diameter. Each section is made up of 9 Plykrome plates; each is formed and placed in a special welding clamp, as shown by cut A page 41, for welding the longitudinal seam, which is a plain butt weld made with 18-8 stainless steel electrodes on the inside and with heavily coated mild steel electrodes on the outside.

The average welding speed is practically 50 ft. per hour and, it is said, is maintained. Nine of such shells are welded together to make the 54 ft. section; the circumferential joints are butt welds made after the plates are square sheared and placed for welding with a 3/32-in. gap between edges. The entire project requires approximately 315,000 lb. of Plykrome, reported to be the largest single installation of stainless clad steel on record.

Punch Press Manufacturer Adopts Roller Bearing Flywheel

A NEW flywheel assembly, Federal-Timken, is announced by the Federal Press Co., Elkhart, Ind. A Federal inclinable punch press so equipped is pictured on page 41. It is claimed that this development is of importance to crankshaft life and in the elimination of clutch troubles caused by flywheel pounding. Other new features are also announced by the Federal Company including—Timkin roller bearings for the back shaft of all back geared presses, an improved clamping device on the pitman for maintaining the adjustment of the ram-adjusting screw, new style upper knock-out brackets and a new method for locking the ball cap in place to prevent throwing off center.

Drill Vise Design Features Parallel Gripping

A NEW drill-press vise having provision that work can always rest in a parallel position is manufactured by the National Machine Tool Co., Racine, Wis., and shown on page 40. Built-in parallels, with resultant freedom from chip interference, together with design finish which permits that the vise itself can be positioned on any one of 3 finished surfaces, feature claims for a wide range of utility. Two in. clearance is provided underneath material drilled in a flat position, while built-in V-grooves assure proper holding for either end or side drilling in round material. Three models are manufactured with 3-in. and 10-in. jaw openings.

The American Building Foundry Co., Chicago, has acquired a group life insurance policy from the Prudential Insurance Co. of America for the protection of 51 workers. The total involved is $31,000.

Cromansil Steel Used in Hull Construction of America's Cup Defender

IN the construction of yachts for important cup races, special attention is paid to strength. The sails, masts and booms are constructed of the best materials available because a break usually means a lost race. To withstand the buffeting of high seas for a 30-mile race, sturdiness of the hull is also paramount, and to have a fleet boat that will win races, this sturdiness must be obtained from material strength and not material weight. The problem of obtaining high strength without excessive weight has been answered in the construction of the Rainbow, America's Cup defender, by the use of Cromansil steel.

According to the Herreshoff Mfg. Co., Bristol, R. I., builder of the Rainbow, and W. F. Burgess, the designer, approximately 40,000 lb. of Cromansil steel, supplied by Lukens Steel Co., Coatesville, Pa., was used in its construction. The use of high-tensile steels was considered first for the areas of hull structure which are subjected to the heaviest stresses. In these yachts, perhaps the greatest stresses in the hull are centered in the top row of outside plates known as the sheer strake and also in the garboard strake, which is the lowest strake of plating. These were both constructed of Cromansil steel.

Other vital parts for which Cromansil was used are the deck stringer plates, which are the edge plates around the deck and which continue all around the top of the vessel. In addition to these it was used for other parts which were also subjected to unusual strain. The gussets and brackets which hold the headstay sheaves and other rigging attachments were fabricated of Cromansil to eliminate danger of breaking.

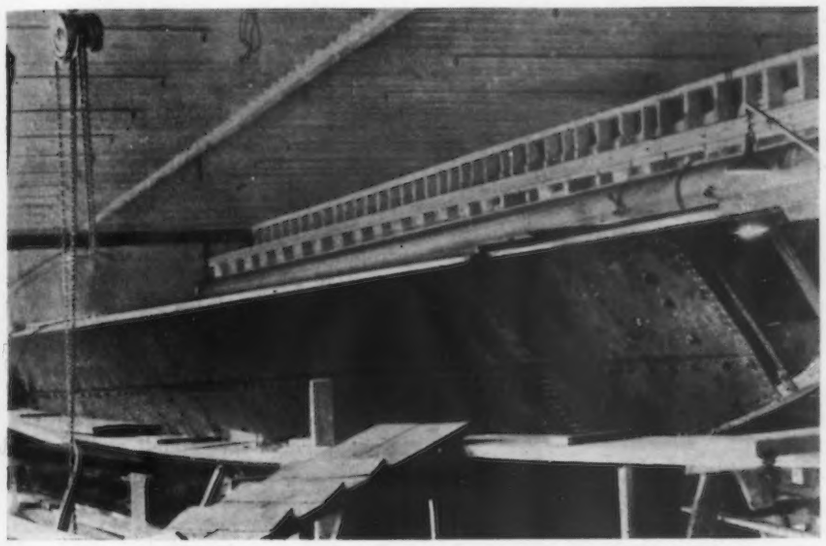
The Rainbow has been called the economy yacht and the use of Cromansil has not belied this name. Cromansil is a low alloy steel, and the increase in cost over ordinary steel is small. It was developed to meet the requirements of high strength, toughness and ease of fabrication together with relatively low cost. The superior physical properties obtainable by its use more than offset the slight expense increase.

As the name signifies, these steels obtain their properties from the three alloying elements, chromium, manganese and silicon. In the present state of development they come within the following range of alloy metal content: chromium, 0.4 to 0.6 per cent; manganese, 0.9 to 1.4 per cent, and silicon, 0.6 to 0.9 per cent. The carbon content may be varied widely, the amount depending on the use to be made of the steel, but for general purposes is held between 0.15 and 0.25 per cent.

The following table compares the physical properties of Cromansil with those of ordinary carbon steel:

	Yield Point, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elong. Per Cent in 2 In.	Red. of Area, Per Cent
Cromansil (0.20C)	60,000	90,000	28	62
Cromansil (0.30C)	70,000	115,000	25	60
Plain Carbon.....	35,000	65,000	24	45

Cromansil is a relatively new member of the alloy steel family. It was developed by Electro Metallurgical Co., New York, as a result of investigations begun in 1926. The present name was not adopted until 1931.



RAINBOW under construction with a hull plate temporarily bolted in place before riveting. The forward section is not yet fitted in place.

THE hull nearing completion and the decking partly on. The deck stringer plates are Cromansil steel.

Cincinnati Milling Machine Co.

Commemorates 50th Anniversary

MORE than a thousand executives of industry, engineers, and interested citizens assisted in the celebration of the fiftieth anniversary of the Cincinnati Milling Machine Co., Cincinnati, Ohio, the week of Oct. 8. For the entire week, the plant of the company was open to the public for inspection, the company furnishing guides for all those desiring to go through the shops. The various types of millers as well as centerless grinders and cutter grinders were in operation with skilled demonstrators in charge. In addition, an historical exhibit of the development of the company's product also was displayed.

In 1884, the Cincinnati Screw & Tap Co., the predecessor of the present company, opened a small shop for the manufacture of screws and taps. This company had no equipment for fluting taps and the officials designed and built a small milling machine to do this work. Other shops in Cincinnati, noting the efficiency and good work of this machine, began to purchase similar ones.

Five years later, under the name The Cincinnati Milling Machine Co., the manufacture of milling machines and cutter grinders had become the company's business. The following year the first machine was shipped to Europe. Expansion of business became so rapid that the company moved to larger quarters where important foundations of engineering and shop practice were laid. Among the features designed at this time was the Cincinnati universal dividing head, the basic principles of which are still embodied in the latest designs.

In 1900, the first positive all geared feed change mechanism in a milling machine brought the company its first gold medal at the World's Fair in Paris. High powered millers were brought out in 1906. These embodied novel spindle drive and feed mechanisms with directional control of feed and exemplified the principle of interchangeable unit manufacture. Power rapid traverse and the standardized spindle nose for all sizes of machines followed. The advent of high speed steel at about this time resulted in the development of "wide spaced" cutters and "high power face mills," which are recognized as standard today.

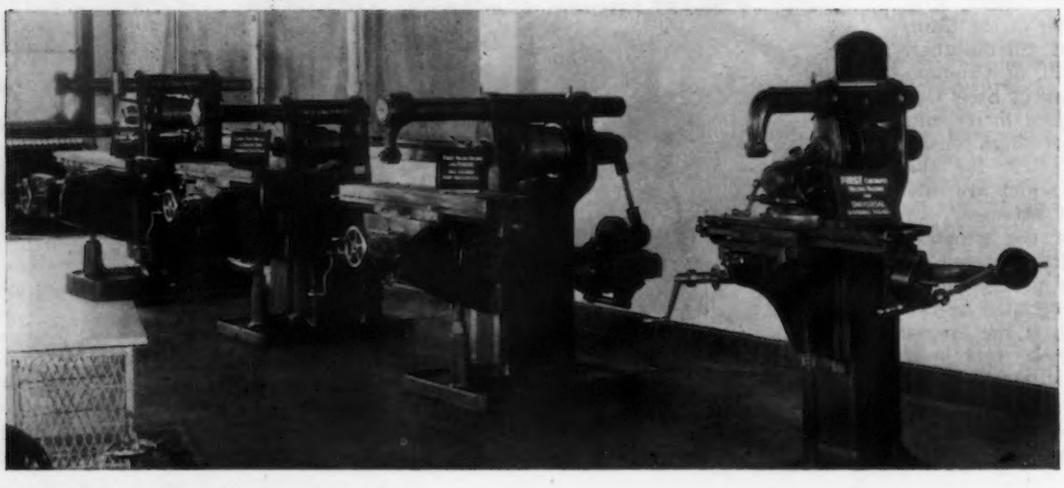
Moves to New Quarters

In 1907, the Milling company had outgrown its downtown quarters and a modern plant was erected in Oakley, the site of the present operations. This was constantly enlarged until it now covers 16 acres of floor space. Shortly thereafter, to insure castings of higher and more uniform quality, a modern foundry was erected.

Continued emphasis upon research and study in the company's shops brought special machine tools to improve accuracy and safeguard precision operations. Among the first of the products resulting from the use of more refined and better synchronized mechanisms was the automatic miller. In this, the table movements and rotation were automatically controlled and the operator's work was reduced to loading and unloading. Rapid table movements and flooded lubrication of the cutters were incorporated. As the productivity of these machines was recognized additional sizes were built up to 72 in. table travel.

The new Nos. 4 and 5 high power machines embodying the rectangular overarm, square gibbed bearings, power rapid traverse, intermittent feed, feed changes from the front, complete directional control from the front and rear with independent reverse to all table movements, sliding gear mechanisms for drive and feed boxes and centralized lubrication, were developed in 1917. Constant refinements of these machines led to the adoption in 1924 of the motor inclosed pyramid column with anti-friction bearings throughout the drive.

The constantly increasing number of customers' problems submitted to the company convinced the officials that its future depended upon a broadened policy of new developments. Extensive field surveys and engineering and laboratory research brought the company's entrance into the grinding field in 1922. Centerless grinding, lapping, broaching, automatic profiling and die-sinking machines were



HISTORICAL development of milling machine features. The first machine on the right is the first Cincinnati milling machine with universal dividing head. Next to the left is the first milling machine with positive all geared feed mechanism. The third from the right is a cone type miller with sleeve type tumbler feed box. The last machine on the left is a cone type miller.

TWO grinders of the Cincinnati company set up for inspection. To the extreme left is a Cincinnati plain self-contained grinding machine, distinguished by its speed, accuracy and smoothness. On the extreme right is a Cincinnati No. 6 centerless grinding machine which was developed for rough and finish grinding of a class of work requiring greater capacity and more horse power.

A SERIES of Heald Bore-Matic machines on display at the Cincinnati Milling Machine Co.'s Fiftieth Anniversary.

designed and built in the years that followed.

At the same time important advances were made in Cincinnati millers. In 1927, the Cincinnati "Hydromatic" was introduced, the first standard milling machine to be offered with hydraulically actuated table feed. This tool also included the advantages of locked hydraulic feed, positive stop and automatically controlled variable feed with constant metal removal.

Heald Machine Co. Exhibits Also

In addition to the exhibition of the company's products, the Heald Machine Co., Worcester, Mass., presented for public inspection its internal centerless grinder, rotary grinders, "Bore-Matics," "Size-Matics," etc.

On Saturday, Oct. 20, approximately 400 men from Detroit came by special train to the Cincinnati Milling Machine Co.'s plant as the guests of the management. They spent the day visiting the various departments and seeing the shop in action.

Company officials attribute much of the institution's success to the enlightened leadership of Frederick A. Geier, who was president of the company for 47 years until his death, March 26, 1934. The anniversary celebration was in a large degree a commemoration of the service and work of Mr. Geier.

Present company officials are chairman of the board and treasurer, Philip O. Geier; president, Frederick V. Geier; vice-president, Walter W. Tangeman, and secretary, Ferris M. Angevin.

Trade Publications

Aging of Zinc Die Castings.—New Jersey Zinc Sales Co. A paper dealing with the life expectancy of zinc alloy castings. Accelerated tests and results are described in order to predict service life of various products. Complete temperature and aging characteristics are given.

Controlled-Atmosphere Electric Furnace.—General Electric Co., Schenectady, N. Y. An illustrated bulletin describes continuous and intermittent furnaces for such uses as bright-annealing, scale-free hardening and normalizing, and electric furnace brazing. Cost data on furnace atmospheres are included.

Air Draw Furnaces.—Hevi-Duty Electric Co., Milwaukee, Wis. Bulletin showing box-type furnace characteristics, operating and maintenance costs, production capacity, and construction characteristics.

Heat and Acid-Resisting Stoneware.—United States Stoneware Co., Talmadge, Ohio. Describing a new type ceramic for resisting heat and acid combinations. Can be used for plating tanks, jars, kettles, piping, nitrating vessels, and chlorination tanks.

Insulating Fire Brick.—A. P. Green Fire Brick Co., Mexico, Mo. Folder showing characteristics of new G-25 brick which is said to produce considerable fuel and repair economies. Used for heat-treating furnaces, kilns and annealing ovens.

Metal Homes.—Stran-Steel Corpn., 6100 McGraw Avenue, Detroit, Mich. A large and well illustrated booklet showing the use of modern steel construction in both exterior and interior of small houses.

Metal Cleaning.—Magnus Chemical Co., Inc., South Avenue, Garwood, N. J. Folder describes new Magnusol solvent for use in removing oil, grease, smut, pigments and abrasives from aluminum, brass and steel products.

THE NEWS OF THE WEEK

Steel Workers Satisfied with Employee Representation Plans, Survey Shows

FULLY 86 per cent of the steel workers of the country are standing behind their employee representation plans of collective bargaining, according to the results of an industry-wide survey just completed by the American Iron and Steel Institute. The institute's survey, covering the period from July 1, 1933, to June 30, 1934, presents the results of collective bargaining in 35 leading steel companies operating plants in all sections of the country and employing 320,000 workers.

Although the period covered by the survey has been one of turbulence in industrial relations in many industries, employee representation in the steel industry is shown to have settled thousands of cases quietly and orderly. That the plans operate to the benefit of employees rather than their employers is indicated by the fact that 71 per cent of all cases settled were favorable to the workers.

Of the total number of employees, 86 per cent are shown to have voted in employee representation plan elections, and thus to have registered satisfaction with this form of collective bargaining.

Handle 12,709 Cases

The survey reveals the employee representation plans as a practical and efficient method of collective bargaining and one that is actively functioning. During the period covered by the survey, 12,709 cases were brought before joint committees of employees and managements. Of these, 8563 were decided in favor of employees and only 1965, or 16 per cent, in favor of management. Agreeable compromises were reached in 823 cases (6.8 per cent), and 695 cases (5.8 per cent) were withdrawn. On the last day covered by the survey, 663 cases were still pending.

A wide range of matters affecting working conditions and rates of pay come up for consideration under the plan. Cases submitted by the employees for consideration of the joint committees are divided into three general classes in the survey: Wage problems, working conditions and safety measures.

To improve working conditions, employees brought 7389 cases before their committees, or 58 per cent of all cases considered. Cases in this group concerned health and sanitation conditions in plants, pension and relief work, recreation facilities, employee transportation, and other factors which influence employee contentment.

Wage questions were raised 3713 times, 29 per cent of the total, while 13 per cent of the problems, 1607 cases, related to plant safety. To settle the 12,709 separate cases which were considered, representatives of employees and management were required to hold 5791 meetings during the year.

COLLECTIVE BARGAINING IN THE STEEL INDUSTRY
July 1, 1933 to June 30, 1934

Number of companies furnishing data	35
Number of plants operated by these companies	159
Total employees covered by survey	319,105
Per cent total employees supporting plan*	86
Number of meetings held	5,791
Number of cases discussed	12,709
Subject of Cases	
Working conditions	7,389 cases—58.2 per cent of total
Wages	3,713 cases—29.2 per cent of total
Safety	1,607 cases—12.6 per cent of total
Number of Cases Settled—12,046	
In favor of employees	8,563 cases—71.1 per cent of total
In favor of management	1,965 cases—16.3 per cent of total
Compromised	823 cases— 6.8 per cent of total
Withdrawn	695 cases— 5.8 per cent of total
Number of Cases Pending—663	

*Indicated by the number of employees voting under employees' representation plans at the last election in each plant during the period surveyed.

Export-Import Bank To Offer Services

THE National Foreign Trade Council has announced that George N. Peek, president, Export-Import Bank, and special adviser to the President on foreign trade, has arranged to open headquarters on the convention floor of the Hotel Commodore, New York, for the three days commencing Oct. 31, of the National Foreign Trade Convention. This is expected to afford opportunity to many of the 2000 foreign traders attending the convention to confer personally with the officials of the Export-Import Bank in regard to their problems on foreign trade financing and long-term credit insurance.

The applicants for information, financing and credit assistance are expected to submit their questions and problems, in writing, in advance of appointment for personal interviews.

It has also been announced that Ralph Dawson, vice-president, Guaranty Trust Co., New York, will speak on the relationship of the commercial banks with their clients, exporters and importers, who are seeking Governmental assistance which the Second Export-Import Bank was formed to render.

Employees of Milwaukee Plant Obtain Injunction Against Mass Picketing

AN important precedent has been established in relations between labor and industry in Wisconsin by the granting of an injunction by Judge John J. Gregory of the Circuit Court for Milwaukee County restraining all but members of Bridge, Structural and Ornamental Iron Workers Union 471 from picketing the plant of the Wisconsin Bridge & Iron Co., where a strike is in progress. The injunction was sought by 80 non-union employees of the company. It is the first to be granted in the Circuit Court at Milwaukee in which one group of employees was suing another. The decision sets another precedent by placing the ban on pickets not affiliated with the defendant union. Most of the violence and disorder in the numerous strikes to which Wisconsin industries have been subject in recent months is attributed to the presence in picket lines of total strangers with no interest in the cause save a sympathy with the strikers or lust for excitement.

Judge Gregory's decision affirms the right to strike and peaceful picketing granted by the laws of Wisconsin, allowing "peaceful picketing in reasonable numbers" by union men, provided that passage along sidewalks and through factory entrances is not blocked. The court did not interpret what would be construed as "reasonable numbers."

The non-union workers at the Wisconsin Bridge & Iron Co. contended that they were desirous of continuing to work, as is their right, without being subjected to intimidation and force, and that they had been threatened and jostled on their way to and from the plant. The court says:

"The evidence shows that much of the disturbance was caused by men who were never employees of the company and who were not members of the defendant union. Witnesses for the plaintiff have testified that they are not afraid of violence at the hands of their co-workers, but feared the presence of large numbers of unrecognized strangers."

The court pointed out that the presence of large numbers of pickets made it almost impossible for police or workers to recognize persons who jostled them or uttered threats, and ruled that the picketing as carried on near the bridge works was "a clear violation of the inherent right to work."

Joseph A. Padway, counsel for the Wisconsin Federation of Labor, commented on the decision as follows:

"We do not look upon the decision as unfavorable, because there are sufficient union members on strike to maintain effective picketing. Of course, if the time ever comes when the union members should get jobs elsewhere, or for some other reason there were not sufficient pickets to maintain our rights, we would seek a modification of the order."

British Steel Markets Still Active With Pig Iron Being Exported

LONDON, ENGLAND, Oct. 22 (*By Cable*).—British iron and steel production is again expanding. New transactions in pig iron are light as most consumers are covered until and beyond the end of the year, but the statistical position is strong in view of the low stocks and steady specifications. Hematite home demand is improving and odd cargoes are being shipped to Denmark and Italy even though competition of Dutch hematite is formidable.

English makers of semi-finished steel are benefiting from decreased Continental competition. Exports of finished steel to Empire and foreign markets are steadily increasing. Bright prospects are ahead of the home market owing to the acceleration of building operations, busier motor and engineering trades and admiralty contracts.

The tin plate market is steady and fair home business is being done. Some small export orders have been placed, but inquiries for substantial tonnages are circulating.

The quieter tendency in the Continental iron and steel markets persists. Merchant steel is active but plates and sheets are very dull. Semi-finished steel is less active because of fewer United Kingdom orders, Argentine has distributed 3,400,000-peso order for canalization tubes among United States, Germany, United Kingdom, France and Belgium.

Germany is securing most of the South American business by barter arrangements and has thus also booked important orders for tubes from British India and the Netherlands East Indies.

Recent negotiations of the International Thin Sheet Cartel brought no tangible results and a further meeting is to be held this week.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hrth.	£5 10s.	to	£5 15s.
Tin plate, per base box	18s.	2d.	
Steel bars, open-hearth	£7 17½s.		
Beams, open-hrth.	£7 7½s.		
Channels, open-hearth	£7 12½s.		
Angles, open-hearth	£7 7½s.		
Black sheets, No. 24 gage	£9 5s.		
Galvanized sheets, No. 24 gage	£11 5s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Steel bars, merchant	£3 5s.		
Sheet bars	£2 8s.		
Plates, ¼ in. and up	£4		
Plates, 3/16 in. and 5 mm	£4 2s.	6d.	
Sheets, ⅛ in.	£4 7s.	6d.	
Beams, Thomas	£3 2s.	6d.	
Angles (Basic)	£3 2s.	6d.	
Hoops and strip base	£4 2s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

Lee Spring Co. Issues Handy Specification Form

A GENERAL spring specification form intended for the convenient use of spring consumers has been devised and issued by Lee Spring Co., 30 Main St., Brooklyn, N. Y. It consists of a page of blank specification items which cover all of the usual technical requirements met in properly defining the physical aspects of various types of springs. On the opposite page are given data covering chemical composition, grades, dimensional limits and permissible variation in tolerances.

The members of the gold bloc — France, Switzerland, Belgium, Luxemburg, Holland and Italy — have reached an agreement to foster trade between their respective countries. A committee is to be set up in this connection.

... PERSONALS ...

V. L. CONLEY, who has been assistant district manager of the Cleveland sales office of the American Rolling Mill Co. for several years, has been transferred to the Pittsburgh district as assistant district manager in charge of the Buffalo office which the company has opened at 17 Court Street in that city. Assisting Mr. Conley will be R. W. BRYANT, with headquarters at Rochester, N. Y.

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H. V. GLUNZ has been appointed general manager of operations of the Ohio Ferro-Alloys Corpn., Canton, Ohio. He was graduated from Ohio State University in 1915 and has had a broad steel experience, embracing particularly the production of alloy steels.

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RUFUS S. COLE has been named executive vice-president and general manager of the Hupp Motor Car Corpn., Detroit. He joined the company in 1915 as Oriental sales manager, later became sales promotion manager and then general sales manager. In 1928 he was made vice-president in charge of sales and a year ago was appointed assistant general manager.

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WALTER ROE has been appointed chief master mechanic of the Hupp Motor Car Corpn., Detroit. For a number of years he was connected with the Oakland Motor Car Co., Pontiac, Mich., division of General Motors Corpn.

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W. W. SCOTT, JR., who has been connected with the Laclede Steel Co., St. Louis, for the last 12 years, first as general sales manager and for the last few years as vice-president in charge of sales, has been elected a director of the company.

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O. C. HUFFMAN, president, Continental Can Co., Inc., New York, has accepted the chairmanship of the metals, heavy hardware and machinery section of a committee of business men to carry on a campaign to increase the membership of the Merchants' Association of New York in order that the work done by that organization may be made more effective. HAROLD H. BERRY, treasurer, Combustion Engineering Co., will serve as his assistant. D. N. MAUGER, Babcock & Wilcox Co., will be chairman of the group seeking memberships among manufacturers of engine boilers and machinery. The association's membership campaign is being carried on under the general chairmanship of Malcolm Muir, president, McGraw-Hill Publishing Co., who has, in turn, enlisted ROLLAND J. HAMILTON, president, American Radiator Co., to head up the industrial division in which the machinery group falls.

V. L. CONLEY

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DR. WILLARD L. THORP has been named associate economic adviser to the National Industrial Recovery Board in the division of research and planning, and will be the division's representative and chairman of the Advisory Council. Doctor Thorp has been professor of economics at Amherst College and a member of the research staff of the National Bureau of Economics Research, Inc. Since going to Washington as a member of the committee on government statistics he has served as director of the Bureau of Foreign and Domestic Commerce, and is now director of the consumers division of the National Emergency Council and a member of the Federal Alcohol Control Administration, the committee on mineral policy and the industrial resources committee.

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DR. HERMANN VON SCHRENK, consulting timber engineer, St. Louis, and senior vice-president of the American Society for Testing Materials, was elected to the office of president on Oct. 9. This action was taken by the executive committee to fill the vacancy caused by the death of W. H. BASSETT, who died on July 21 soon after he took office as head of the Society. A. C. FIELDNER, chief engineer, Experiment Stations Division, United States Bureau of Mines, Washington, has been elected junior vice-president. No action was taken to fill the unexpired term of Mr. Fieldner as a member of the executive committee.

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H. P. MCCANN, formerly president and general manager of the McCann Harrison Corpn., Cleveland, has become associated with the C. O. Bartlett & Snow Co., Cleveland. He has been closely identified during the past 18 years with the development and manufacture of industrial furnaces.

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ROGER W. ANDREWS, until recently assistant to the president of the Blaw-Knox Co., has been made Western manager of the Combustion Engineering Co., Inc., New York. His connection with the steam power field dates back to 1910 when he joined the Northern Equipment Co. He formed the R. W. Andrews Co. in 1914 and the following year formed the Andrews-Bradshaw Co. When this company was merged with the Blaw-Knox Co. as a division of the latter, Mr. Andrews became manager of that division. He was later made assistant to the president.

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FRANK J. JOHNSON, president and one of the founders of the American Hoist & Derrick Co., St. Paul, Minn., has resigned. FREDERIC CROSBY, son of OLIVER CROSBY, one of the founders of the company, has been made president, and HOWARD S. JOHNSON, son of FRANK J. JOHNSON, retains his post of vice-president. HAROLD O. WASHBURN, formerly general superintendent, has been appointed vice-president and treasurer.

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JOHN G. ZUMMACH, formerly with the Young Radiator Co., Racine, Wis., has become associated with the Hexcel Radiator Co., Milwaukee, as chief engineer of its commercial and air conditioning division. Mr. Zummach was associated from 1908 to 1921 with FRED M. OPITZ, president and general manager of the Hexcel company, in other firms.

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CLAUDE A. STEADMAN has become associated with the Pioneer Engineering & Mfg. Co., Detroit, designer of tools, dies, gages and special machinery. He was formerly with various motor companies as tool and die engineer, later with the Taft-Pierce Mfg. Co., Woonsocket, R. I., and for the last five years chief tool designer for the Wright Aeronautical Corpn., Patterson, N. J.

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R. R. LALLY, who has been for several years manager of sales at New York for the Globe Steel Tubes Co., Milwaukee, has been made vice-president in charge of Eastern sales.

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CLAUDE C. OSTROM has been made general manager and a director of the Bradley & Hubbard Mfg. Co., Meriden, Conn. Until recently he was president and treasurer of the Foster-Merriam Co.

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FRANK C. JONES, president of the Okonite Co., New York, was elected president of the National Electrical

Manufacturers' Association at its annual convention at Chicago.

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DR. ERWIN R. STOEKLE, vice-president and chief engineer, Globe-Union Mfg. Co., has been elected president of the Engineers' Society of Milwaukee. He succeeds WILLIAM D. BLISS, president, Bliss Brothers Tool Co. BRUNO V. E. NORDBERG, executive engineer, Nordberg Mfg. Co., has been elected vice-president, and WALTER R. MUELLER, of Fred H. Dorner & Co., has been reelected secretary-treasurer. WALTER FERRIS, vice-president, Oilgear Co.; R. C. NEWHOUSE, chief engineer, Allis-Chalmers Mfg. Co., and DR. F. A. KARTAK, dean of the school of engineering, Marquette University, have been elected directors.

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WILLIAM SPRARAGEN, who for the past 15 years has held the position of secretary of the division of engineering and industrial research of the National Research Council, has become president of the newly-organized Spraragen Engineering Corpn. This firm will specialize in servicing companies with up-to-date expert welding engineering information. Mr. Sprargen continues as secretary of the American Bureau of Welding.

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W. A. REEDER has been appointed general agent in Louisville for the Mississippi Valley Barge Line Co., succeeding W. ALBERT WILDE, who has been promoted to general freight agent in Cincinnati.

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DR. FREDERIC M. BECKET, president Union Carbide and Carbon Research Laboratories, Inc., has been elected to honorary membership in the Electrochemical Society, of which he was president in 1925.

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PAUL M. WEISS, general business manager of the North Tonawanda division of the Crane Co., has been named assistant works manager of the company at its Chicago headquarters. Mr. Weiss was an employee of the American Radiator Co. at the time of the war. He joined the motor transport service and following the end of hostilities, he became associated with Archer A. Landon in the establishment at North Tonawanda of the Landon Radiator Co. He continued with this concern from 1926 to 1930 as secretary and director, later assuming the position of general business manager when the Crane Co. took over the property. His successor at North Tonawanda will be W. E. PETERSON.

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FRED D. HANSEN, general manager, Federal Pressed Steel Corpn., Milwaukee, has been appointed by the NRA as administration member, without vote, on the code authority of the saw mill machinery industry.

... OBITUARY ...

DAVID B. OLIVER, who for many years had been identified with the iron and steel industry, died at his Pittsburgh home on Oct. 21. He lacked nine days of being 100 years old. He was born in Ireland in 1834 and emigrated to the United States in 1840. In 1857 he worked in the Pittsburgh post office and two years later became agent of the old Ohio and Pennsylvania Railroad at Wooster, Ohio. In 1863 he became a shipping clerk for Graff, Bennett & Co.'s iron works at South Pittsburgh. The next year he went to Kittanning as general manager of a rolling mill. In 1868 he and his brother, Henry W. Oliver, associated with William J. Lewis and John Phillips in the operation of a nut and bolt factory at South Pittsburgh. The firm of Lewis, Oliver and Phillips was reorganized in 1880, when the company became Oliver Brothers and Phillips, with David Oliver as general manager. He continued in that position when the firm was incorporated as the Oliver Iron & Steel Co. in 1888. In 1900 the Oliver Iron & Steel Co. sold many of its holdings to the United States Steel Corpn., retaining the South Side mills. Mr. Oliver in that year decided to retire from active participation in business. Since 1900 he devoted practically all of his time to educational activities. He was credited with having conceived the "sliding scale" of wage payments, commonly known as the "bar iron scale" which based the tonnage rate of puddling iron on the current market price of bar iron.

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HARRY R. SINCLAIR, president of the Worcester Stamped Metal Co., Worcester, Mass., died at his home in that city on Oct. 11, aged 62 years. Soon after his graduation from the Worcester Polytechnic Institute in 1893, he became assistant to the superintendent of the Builders Iron Foundry at Providence. In 1906 he was made a partner in the W. & S. Mfg. Co., and in 1916 was elected president of the Worcester Stamped Metal Co., successor to the W. & S. company.

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LEWIS A. PEASE, mechanical engineer, A. O. Smith Corpn., Milwaukee, died Oct. 18 after a short illness at the age of 50 years. He was a graduate of the school of engineering of the University of Illinois. During the World War he served as a lieutenant commander in the United States Navy with duties as maintenance executive at Great Lakes Naval Training Station near Chicago. In 1919 he became associated with the main works of Fairbanks, Morse & Co. at Beloit, Wis., as chief maintenance engineer. He was later appointed consulting engineer on special power plants and on heavier types of products. He joined the Smith company on Aug. 1, 1933.

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MAURICE GERARD, former consulting engineer in Chicago for the Rock Island Railroad and General Motors Corpn., died recently at his home in Beverly Hills, Cal. He was a graduate of the University of Birmingham, England, and had been retired for the last 15 years.

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THOMAS J. REID, who retired three years ago from the superintendency of the Aurora Foundry Co., Aurora, Ill., died recently at Irvington, N. J. He was 67 years old.

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CHARLES B. JACOBS, metallurgist and inventor, died of pneumonia at the Waterbury, Conn., hospital on Oct. 18. He was associated for some time with the American Brass Co. at Waterbury and received the John Scott Medal in 1914. He was awarded a silver medal at the Louisiana Purchase Exposition in 1904. For many years he maintained a laboratory in New York.

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ELMER E. ARENSBERG, president, McCullough Dalzell Crucible Co., Pittsburgh, died at his home in that city on Oct. 18, aged 64 years.

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KENNETH I. SMALL, manager of the New York office of the Chicago Bridge & Iron Works, was killed by a truck on Oct. 10, at Portland, Me. Mr. Small was born at Chicago and became identified with the Chicago company in 1898. He had been in charge of the New York office since 1910. He was 55 years old.

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R. Y. FERNER, who 15 years ago founded the R. Y. Ferner Co., Washington, D. C., died of a heart attack on Oct. 7, aged 58 years. He was formerly identified with the Bureau of Standards.

Specifications and Tests For Coal and Coke

A COMPILATION of all the standard and tentative specifications and tests for coal and coke as issued by the American Society for Testing Materials has been published in a pamphlet of 108 pages. It includes five specifications, 13 methods of test and the standard definitions of terms relating to coal and coke. Copies of this publication can be obtained from A.S.T.M., 260 South Broad Street, Philadelphia, at $1 each.

THE WEEK IN WASHINGTON

Administration Tries To Restore Confidence

Industrial and Financial Leaders Are Being Quietly Asked To Contribute Ideas On Business Recovery—Mystery Still Prevails

By L. W. MOFFETT
Resident Washington Editor, THE IRON AGE

WASHINGTON, Oct. 23.—Moves by President Roosevelt to restore confidence and start a vigorous upswing toward recovery are seen in increasing White House visits by industrial, financial and business leaders of the country. This ostensible effort to establish closer cooperation between the Government and business has perceptibly improved sentiment, but, until the program under way is developed and actual application has proved its soundness, there still remains a feeling of uncertainty.

Questions as to policies on money, labor, the budget and Government expenditures are among those uppermost in the minds of business men. While it is felt that the Administration probably cannot give specific answers to some of them, it is definitely desired that a more certain and fixed attitude be taken than has been evident. On some of these problems it is also thought that such a stand will be made known and that that in itself would be an important factor in providing the stability and confidence now lacking.

Business Contacts Emphasized

The broadened contact with industrial, financial and business men and newspaper publishers has been emphasized recently, although it actually began some six weeks ago at Hyde Park. The White House has not disclosed the definite purpose of the conferences but it is clear that efforts are being made to restore confidence and to set up a program looking to industrial recovery. The assumption in some quarters is that the program in mind is to be laid before Congress, though hope has been expressed that the movement toward improved business conditions will be started long before Congress convenes. For it will not begin its session until January and the need for industrial stimulus and increased employment long before that time is pressing.

"The President is meeting representatives of all businesses and industries," said Stephen Early, White House secretary, "and the information they give him he plans to sift thoroughly in his effort to improve general conditions."

Broad Program Contemplated

Beyond this statement and disclosure of the President's plan to expand rural building activity and slum clearance, nothing has come from the White House. But it is believed that the program contemplated is broad in character and embraces efforts not only to gain closer cooperation between the Federal Government and business but also aims to inspire much greater initiative by private industry itself with freer participation by the banks. For there is increasing complaint that, until private industry becomes much more active than at present, anything like complete recovery cannot be expected.

The realization is growing that, until private industry gets going under its own momentum, huge Government relief rolls are inevitable, and this means mounting taxes and the threat of continuance of an unbalanced budget. Governmental financial assistance through loans to industry, or to aid industry and employment, though seen as a necessity under present conditions, is supposed to be repaid, but it is recognized that it can never attain proportions that would be at all adequate to restore industry to a sound and profitable basis. Moreover, such widespread "socialization" of industry is opposed by business generally, which wants it tapered down to the minimum. As it is, the country is in the unhealthy condition in which a substantial part of business and industrial activity is being conducted on either direct or indirect Government money.

Banks Urged to Loosen Up

One of the principal moves being made is to get the banks to "loosen up," though there is decidedly less criticism of the bankers than existed previously. For one thing, it has become apparent that the availability of a sound borrowing market has been restricted because, with an absence of business, there were not nearly so many potential borrowers as had been represented to exist, and would not be until business confidence had been restored.

It is clear, however, that the Government is seeking to interest borrowers and to bring about more favorable terms through more moderate interest

rates. At the same time, effort is being made to tie in the banker by showing that such a market is desirable and would mean returns on capital which now lies idle. The purpose appears to be to give assurance that loans would be for a reasonable period and not subjected to calls which would discourage borrowing. This view is based on a statement by Jesse Jones, chairman of the Reconstruction Finance Corpn., that a five-year extension will be allowed to borrowers if the security is not prejudiced by the offered leniency. This policy, however, has been met with some criticism by bankers who claim there is inconsistency in the Government's freer attitude toward slow loans, while, at the same time, it requires examiners to exercise greater care and better judgment in listing such paper.

The Government's efforts to obtain greater cooperation also were seen in the New York address by Governor Eugene R. Black of the Federal Reserve Bank, in which he told the Savings Banks Association of New York State that bankers "will never redeem their place in America until they do fight for themselves and for recovery of the country." Governor Black, credited with being a contact between the White House and bankers of the country, said that the future of banking, the subject with which he dealt, involved consideration of the immediate past and present conditions of banking and its responsibilities. These, he declared, center on present business conditions; the extent of recovery, the fears and apprehensions of business, such as the destruction of individual initiative, profits, monetary policies, the budget and taxation. Particular signficance was given Governor Black's remarks because two days prior to making the address he was a luncheon guest at the White House. The speech also heightened interest in the speech the President himself is to make tomorrow night before the American Bankers Association.

Capital Goods Group Important

But whatever development may come about through a greater cooperation between the Government and bankers, it is, of course, well known by the Administration that recovery in a real sense is out of the question until the capital goods industries are restored to healthy activity.

It is assumed, though there has been no confirming statement, that the subject has been freely discussed by the President with prominent industrial leaders with whom he has recently held conferences, including Myron C. Taylor, chairman, United States Steel Corpn.; Owen D. Young, chairman, General Electric Co., and William R. Grace, prominent ship owner.

The President has stated that he will include in his recommendations to Congress an enlarged program of Federal housing projects for both rural building and urban slum clearance. This kind of relief is looked upon by the President as having proved successful. By coincidence or otherwise the proposal was made simultaneously with the Treasury's daily statement for Oct. 15 which showed that emergency expenditures since July had moved up to the huge total of $1,015,443,339, almost one-half of it for direct relief. Total expenditures were shown to have been $1,828,396,679, which reflected a deficit of $707,033,183, despite the increase in revenue of $267,844,946. Apprehension over enormous Government expenditures was allayed partially by the President when he turned thumbs down on the soldiers' bonus in his message dedicating the neuropsychiatric hospital at Roanoke, Va.

It was indicated that the President had in mind a sharp expansion in experiments by the PWA in slum clearance and subsistence homesteads as a means of removing families from relief rolls. Funds so far appropriated for subsistence homesteads and low cost housing construction total $200,000,000. It was not indicated how much more will be asked. This program is apart from the home modernization and home building program of the FHA. Plans are being made to coordinate all the housing agencies.

More Money for Housing

Meanwhile Harold L. Ickes, Public Works Administrator, has stated that he "could easily spend between $300,000,000 and $400,000,000 in the subsistence division of the Interior Department. He added, however, that he had not decided to ask for that much, but said "Congress would continue to do whatever is necessary to aid unemployment." Federal Relief Administrator Harry L. Hopkins last Friday announced plans for building 12 industrial communities.

These enlarged Governmental activities, whatever their necessity or merit, however, do not provide the stimulation necessary for the durable goods industries. The point has been stressed that private initiative is the outstanding need, but Governmental aid in other directions, it has been emphasized, would do more for the durable goods industries than would housing and slum clearance work. It is hoped that the latter will be only a part of the effort to bring about recovery through Governmental aid over and above the more important participation of private banking and industry themselves.

Prospective Rail Buying

An immediate prospect of aid for the durable goods industries is found in reports that western railroads are preparing to come into the market for round tonnages of steel rails, to be financed by Government funds. While no confirmation of the reports has been made in Washington, it is believed that, if the carriers have such a plan in mind, it would be encouraged by the PWA. The sharp letdown in railroad buying is undoubtedly due in part to the disinclination of carriers to go into debt through Government borrowing. The outlook for early improvement in business is held by many railroads which do not have to come into the market as not being sufficiently encouraging to finance purchases with Government money.

On the other hand it is known that some carriers which need rail and other requirements at this time have not bought because they consider the Government security terms too rigid. It is reported, however, that, as a means of aiding the carriers to buy at once, and also as a means of stimulating the steel industry, the PWA would probably relax terms. It is held to be a certainty that though its funds are pretty well exhausted the PWA would stand ready to supply sufficient money for railroad requirements.

Further Labor Developments

Further development of the Administration's labor policy as it relates to wages and hours is expected to be made known through early action by the National Industrial Recovery Board. While it has been made clear that there will be no fixed plan but that industries will be dealt with individually, a fair index of policy for major industries is looked for when the board takes up for consideration renewal of the automobile manufacturers' code, which expires this week.

This code recently was renewed for a short period and it is known that organized labor is making a vigorous effort to have the present average 40-hr. week pared down and also to get modification of the existing provision for a 48-hr. week during peak seasons. In view of the American Federation of Labor's action at the San Francisco convention in urging a 30-hr. week it would not be surprising if it made a gesture toward that goal in the automobile code as a "model" for other codes. That organized labor really thinks it stands the slightest chance of getting such a concession is hardly credible. A reduction in the average work-week has nevertheless been strongly implied as the intention of the Administration.

Generally it is reported that a "compromise" on a 36-hr. week would be acceptable, although nothing of an official character has been announced. Previously, the Administration's effort to reduce the work-week without raising wages met with such strong opposition from labor that the plan fell flat. There is reason to think that industry is just as firmly op-

posed to any such scheme now as heretofore.

New Recovery Board Functions

That the newly organized NRA has put the "spectacular and glamorous" behind it, as S. Clay Williams said it proposed to do, was indicated in the past week. While the new recovery board is actively seeking to work out policies, it is not doing so with a blare of trumpets, but instead has moved along quietly and even omits some of the heretofore customary announcements regarding important additions or changes in its staff.

The appointment of Edward R. Stettinius, Jr., as adviser to NIRB was not formally announced. Mr. Stettinius has been vice-chairman of the finance committee of the United States Steel Corpn. He took that position last December upon resigning as liaison officer of the NRA Industrial Advisory Board. Previously he was vice-president of the General Motors Corpn. Recalling Mr. Stettinius to the NRA was pointed to as further evidence of its adopting a conservative policy and seeking aid of outstanding industries in seeking a way back to recovery. The appointment was looked upon as substantial indication of purposes to establish closer cooperation with and aid from industry, although it is realized that also on the board and its staff are men whose economic and labor views are of the "left wing" kind.

In his new position, Mr. Stettinius will be an even more important member of its staff than he was before. He becomes a spokesman for the NRA as a contact officer and adviser for the board in industrial matters and with his broad background necessarily will reflect the views of both the board and industry.

Dr. Thorp an Economic Adviser

The board, however, did announce the appointment of Dr. Willard L. Thorp as associate economic adviser in the Division of Research and Planning. He is the division's representative and chairman of the advisory council. Dr. Thorp was originally named by President Roosevelt as director of the Bureau of Foreign and Domestic Commerce, but the Senate, which considered his name, refused to confirm him, due, his friends say, to petty politics. Dr. Thorp has been professor of economics of Amherst College and a member of the research staff of the National Bureau of Economic Research, Inc. He is director of the consumers division of the National Emergency Council and a member of the Federal Alcohol Control Administration, the Committee on Mineral Policy and the Industrial Resources Committee. Dr. Thorp is represented as being strongly opposed to price fixing and may be influential in the revision of codes in this respect.

Tariff Bargaining To Be Kept On Sound Basis—"Horse Trading" Out

WASHINGTON, Oct. 23.—In his refreshingly frank and blunt statement of last week denouncing unnamed countries for raising tariff duties in preparation for reciprocal bargaining with the United States, Secretary of State Cordell Hull strongly intimated that the United States will not bargain with such countries. Coming from the State Department, which is given to "leaning over backward" in the name of so-called diplomacy, the rebuke was unusual and no doubt significant as serving notice to other countries that they will either deal fairly or be disregarded entirely.

Yankee trading, as the reciprocal tariff act is known, will not be reduced to the level of barnlot horse swapping, Secretary Hull indicates. The effect of this policy can be speculative only, but in cases where the United States exports more to than it imports from a country, the loss would rest with America. Nevertheless, the policy is accepted as being entirely sound. For if one country, no matter how important from a trading point of view, jockeyed the United States into unfair deals, it is clear a precedent would be set for other countries to do likewise.

Germany in Mind

Yielding to the dictates of diplomacy, Secretary Hull omitted the name of the country or countries he had in mind. It hardly requires a stretch of the imagination, however, to suspect that uppermost in his mind was Germany. For Germany has recently adopted a policy looking to reduced imports and increased exports by tariff juggling. Emphasizing this policy, Germany also has just informed the United States that she desires to bring to an end the most-favored-nation agreement with the United States.

This is taken to mean that Germany proposes to engage in tariff bargaining with a free hand whereby it can give preference in duties to other countries over the United States. Obviously—and assuming it lives up to the most-favored-nation agreement—this could not be done. For under such an agreement, the United States would be entitled to the benefit of the minimum duties which may be extended to other nations, just as Germany and other countries with which the United States has such an agreement are entitled to minimum duties provided in tariff bargaining with countries with which the United States may or may not have such an agreement.

The moves of foreign countries in hiking tariff duties in anticipation of entering upon reciprocal bargaining with the United States was an expected development. Precisely such action was predicted when the tariff bargaining act was before Congress. It was predicted by both Republicans and Democrats and therefore did not have a partisan color.

Germany, of course, is far from being alone in engaging in the practice which Secretary Hull attacked. Numerous other countries have long done likewise and the strange thing is that the United States let it pass with more or less feeble protests, generally without any favorable result. France has been notable for indulging in the practice in one form or other. Her system of so-called quotas and of levying extremely high rates on products not coming in with carefully prepared specifications is well known. It was always arranged that countries at which the high rates were directed did not produce commodities meeting such specifications, though missing them often by the barest margin.

Industry Opposed to Reductions

On the domestic side, it is certain that American industry as a whole does not share the low-tariff ideas of Secretary Hull and does not want to see him bargain away its interests by further cutting duties. Some already protect American industry inadequately if it is to maintain American living standards and NRA wage rates and hours. The administration, however, has intimated that it proposes to be careful not to let its zeal for "Yankee trading" get the better of it and permit a breakdown in such protection, though its views and those of industries requiring protection may differ rather widely.

Rail Extension In Maine Is Approved

WASHINGTON, Oct. 23.—Approval has been given by the Interstate Commerce Commission to a three-year RFC loan of $3,000,000 to the Quebec Extension Railroad to finance partially construction of a standard gauge electric railroad extending from Washburn, Me., to Lacrontier, Me., a distance of 112 miles. Construction will be begun soon on the 92-mile stretch from Portage to Lacrontier, and, as business picks up, it will be continued to Washburn. The total cost will be $4,100,000. Most of the equipment, including five engines and 10 box cars, will be purchased from connecting carriers.

Farm Equipment Code May Be Extended—Other NRA Developments

WASHINGTON, Oct. 23.—The code authority for the farm equipment industry has submitted a code amendment to extend the life of the code to June 16, 1935. It was approved Oct. 3, 1933, to be in effect until Nov. 1, 1934. Suggestions or objections concerning the amendment must be submitted before Oct. 27 to Deputy Administrator Neal W. Foster.

FLOOR MACHINERY

Approval of a code of fair competition which "will materially assist in restoring the floor machinery industry to a healthy basis of operation" has been announced by the National Industrial Recovery Board. It becomes effective Oct. 27. The code establishes a minimum wage of 40c. per hr. for factory employees and $15 per week for office workers, except that in cities of less than 250,000 population, office workers will receive not less than $14 weekly.

RAILROAD APPLIANCE

Suggestions or objections concerning the provision in the supplemental code for the railroad appliance manufacturing industry prohibiting trade-ins of old equipment and regulating the furnishing of detailed drawings to purchasers, must be submitted to Deputy Administrator W. W. Rose, 4040 Department of Commerce; before Oct. 29. The provisions were stayed when the supplemental code was approved Aug. 1, to permit consideration of any objection.

ROLLING MILL MACHINERY

The NRA has announced that it has extended the time by which code authorities must be elected for the bakery equipment manufacturing industry to Oct. 24, and for the rolling mill machinery and equipment industry to Nov. 1.

CAST IRON SOIL PIPE

Objections or suggestions concerning code authority budgets for the cast iron soil pipe industry must be filed with the administration before Oct. 29. The budget total is $27,192.50 for Aug. 3, 1934, to June 16, 1935. Basis of contributions is 23c. per ton on all shipments of pipe fittings, valves, service, meter and roadway boxes.

WIRE ROPE AND STRAND

The wire rope and strand manufacturing industry, division of the fabricated metal products and metal finishing and metal coating industry has filed a budget total of $6,805 for July 10, 1934, to July 10, 1935. The basis of contribution is that industry members would contribute $2.42 annually, or $0.61 quarterly, for each employee. Estimated number of employees is 2814. Objections must be filed with Deputy Administrator H. Ferris White, Room 510, 1518 K Street, N. W., before Oct. 31.

SAW MILL MACHINERY

Approval of a supplemental code for the saw mill machinery sub-division of the machinery and allied products industry has been announced by the N.R.A. to become effective Oct. 22. Provision is made for the prohibition of sales below reasonable cost, unless code authority, with the approval of the Administration, determines that an emergency exists in the industry. Under the approval order, the 10-day waiting period for prices to become effective after filing, specified in the open-price filing system is stayed pending further order.

CAST IRON SOIL PIPE

Suggestions or objections concerning a uniform cost system proposed by the code authority for the cast iron soil pipe industry must be submitted to Deputy Administrator W. W. Rose before Oct. 26.

METAL SPINNING AND STAMPING

A hearing was conducted Oct. 15 on a proposed trade practice appendix to the code for the fabricated metal products manufacturing and metal finishing and metal coating industry, applicable to the metal spinning and stamping manufacturing sub-division.

The appendix would define the term "metal spinning and stamping manufacturing" as meaning the manufacture of metal spinnings and stampings in conjunction with spinning only; provide for a governing body for the sub-division; fix the maximum cash discount at 2 per cent in 10 days; prohibit inducement to breach of contract, and pre-dating and post-dating of invoices, and provide for formulation of cost finding and accounting methods. It would become effective 10 days after approval by the National Industrial Recovery Board.

TOOL AND IMPLEMENT MANUFACTURING

The hearing scheduled for Oct. 26 on amendments to the code governing the tool and implement manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, has been adjourned indefinitely. First of two proposed amendments would have required that where one or more component parts of an article was manufactured in a foreign country, the article would carry an inscription to the effect that the unit was only partially made in the United States. The other amendment would have permitted the use of the NRA insignia on an article which was completely manufactured in this country.

FORGED TOOL MANUFACTURING

Criticisms, objections or suggestions concerning a proposed modification of the forged tool manufacturing industry code to empower the code authority to prepare and administer a budget must be submitted to Deputy Administrator H. Ferris White, Room 510, 15128 K Street, N. W., prior to Oct. 27, the NRA has announced.

CODE AUTHORITIES NAMED

The NRA has announced recognition of memberships of the following Code Authorities:

Rock Crusher Manufacturing Industry—W. H. F. Thompson, Pioneer Gravel Equipment Mfg. Co., Minneapolis; Wm. P. Gruendler, Gruendler Crusher & Pulverizer Co., St. Louis; Howard Hall, Iowa Mfg. Co., Cedar Rapids; Lewis W. York, Pioneer Gravel Equipment Mfg. Co., Minneapolis; L. B. Frazier, Austin-Western Road Machinery, Aurora, Ill.; and J. E. Kennedy, Kennedy-Van Saun Mfg. & Eng. Corpn., New York.

Hoist Builders Industry—Robert E. Friend, Nordberg Mfg. Co., Milwaukee; G. W. Burrell, Wellman Engineering Co., Cleveland; J. W. Neasham, Ottumwa (Iowa) Iron Works; S. T. Nicholson, Vulcan Iron Works, Wilkes-Barre, Pa.; Hermann Schifflin, Allis-Chalmers Mfg. Co., Milwaukee; and E. L. Pearce, Lake Shore Engine Works, Marquette, Mich.

TRADE PRACTICE COMPLAINTS COMMITTEES NAMED

NRA has announced approval of organization and procedure of trade practice complaints committees for the following industries:

Diesel Engine Manufacturing Industry—Committee to consist of entire membership of code authority.

Scientific Apparatus Industry—Conditional approval of procedure plan. Carl S. Hallauer, chairman; R. E. Gillmore, vice-chairman; Carl Amend, executive committee member, and Dr. Lyman J. Briggs, administration member, of the industry's code authority.

Railroad Car Building Industry—Committee to consist of all members of the code authority.

Packaging Machinery Industry and Trade—Committee to consist of entire membership of code authority.

Shovel, Dragline and Crane Industry—A. C. Brown, Industrial Brownhoist Corpn., Bay City, Mich.; L. A. Larsen, Ohio Power Shovel Co., Lima, Ohio; Alfred Kauffman, Link-Belt Co., Chicago; H. C. Lutkin, counsel, care Alden, Latham & Young, Chicago; H. Kenneth Briggs, secretary, Marion, Ohio.

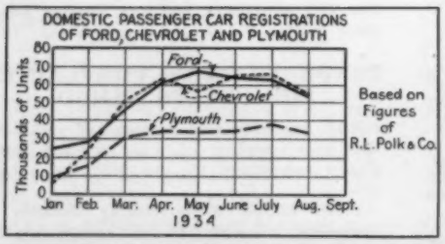
Trailer Manufacturing Industry—Joseph Englaender, Trailer Co. of America, Cincinnati; Harvey Freuhauf, Freuhauf Trailer Co., Detroit; James Menhall, Highway Trailer Co., Edgerton, Wis.; E. Palmer, Kingham Trailer Co., Louisville, Ky.; and Robert Brodie, Owensboro Mfg. Co., Owensboro, Ky.

New Towboat to Make Maiden Voyage on Ohio

SIXTEEN outstanding industrial concerns of the Pittsburgh district are co-operating with the Union Barge Line in celebrating the maiden voyage of the new all-steel, twin-screw, Diesel-powered towboat, "Peace," with tentative scheduled stops at Wheeling and Huntington, W. Va., Cincinnati, Louisville, Evansville, Ind., Paducah, Ky., Memphis, Tenn., Vicksburg, Miss., Baton Rouge, La., and New Orleans.

Starting from Pittsburgh on Oct. 25, the motorship and her tow of modern barges will stop to welcome visitors at the above ports, and the voyage will end with a two-day stay in New Orleans, Nov. 19 and 20. It will be tow No. 150 sent by Union Barge Line from Pittsburgh to Memphis.

Product exhibits will be displayed on one of the nine barges in the tow by the following companies: Allegheny Steel Co., Aluminum Co. of America, American Oil Co., American Steel & Wire Co., Carnation Milk Co., Carnegie Steel Co., Davison Coke & Iron Co., Dravo Contracting Co., Dravo-Doyle Co., Gulf Oil Co., Jones & Laughlin Steel Corpn., McKeesport Tinplate Co., Pittsburgh Steel Co., Spang-Chalfant & Co., Standard Oil Co. of New Jersey and Wheeling Steel Corpn.



THIS WEEK ON THE

Detroit in Happier Frame of Mind As 1935 Plans Take Shape

DETROIT, Oct. 23.

THE automotive situation has taken a favorable turn which has put the industry and its suppliers in a happier frame of mind. The gloom engulfing Detroit the last few weeks has been thick, but has lifted somewhat and promises to disappear entirely in the near future.

This doesn't mean that everything ahead looks rosy. That would be too much to expect in these uncertain times. Nevertheless, some of the indefinite factors contributing to a jittery state of mind have been replaced by definite, constructive factors. Tool and die programs finally are materializing, car makers are setting dates when production of new models will get under way and parts manufacturers are beginning to receive releases so that they can again swing into operation. There is less apprehension concerning what the Roosevelt administration may do.

Steel orders haven't increased much, if any, but activities of certain motor car companies make apparent the fact that tonnage releases for new models cannot be long postponed. There will be a pick-up before the end of the present month, but the first orders in impressive volume probably will not reach the mills until early November. The bulk of the business then is likely to be for December delivery, although mills will receive small releases for tryout purposes which will have a rush tag attached.

Steel Executive Expects Good Business

Steel companies should feel the initial impetus of automotive bookings within the next two weeks, with a slow but steady ascent in operating rates discernible for many weeks ahead. A prominent steel executive sees at least six or seven months of reasonably good business from the automobile industry in the offing. His opinion is supported by others in intimate contact with conditions in the Detroit district.

Delays Now Deliberate

This judgment is pronounced after fully discounting the deliberate delay on the part of automobile manufacturers in developing 1935 models. A year ago the industry was involuntarily held back by the unwelcome and largely unsuccessful tool and die strike; this year it voluntarily procrastinates.

The leisurely manner in which tool and die programs are being worked out is proof that car makers are indifferent about rushing new lines onto the market. It is roughly estimated that $6,000,000 to $7,000,000 worth of tool and die work has been let for 1935 models, with the larger slice of the business going to local shops. All the talk about most of the tools and dies being made secretly outside southern Michigan is discredited. Naturally some of the orders have been allotted to plants in other cities, but these companies have participated in automotive tool and die programs for several years. The main point is that last year automobile companies sent much work outside of Michigan because of labor trouble, the work being scattered from Chicago east to the Atlantic Coast. No such diffusion of orders has occurred this year. Detroit, with labor fairly tranquil at the moment, has resumed its position of leadership in the manufacture of automotive tools and dies.

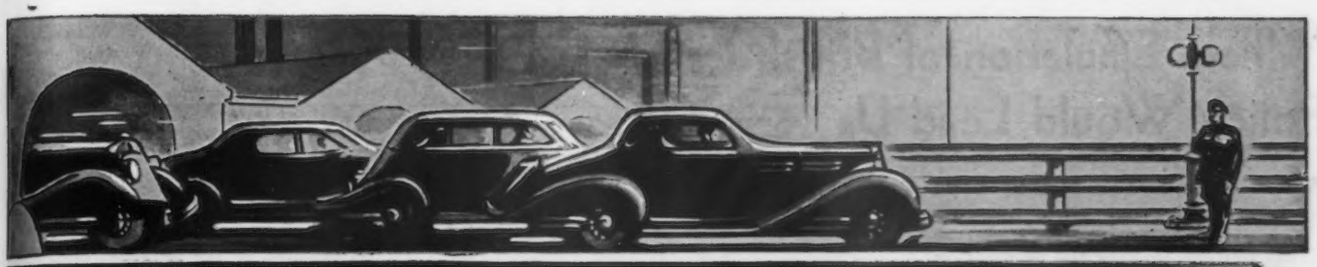
Before 1935 plans are completed, it is believed that the automobile industry will have spent $11,000,000 to $12,000,000 for tools and dies, a larger amount than was expended a year ago. Most of the current outlay, of course, is for body dies, since body design changes constitute the chief innovation promised in the new cars.

It appears that Plymouth probably will be the first of the Big Three to announce its new car. Manufacture of Plymouth parts is increasing slowly. Briggs the past week completed the first of the new Plymouth bodies. Initial assemblies are expected to be made at the local Plymouth plant this week, although volume production will not be attained until next month.

Total output of cars this month by Chrysler Corpn. will be small. A gain will be registered in November, principally in the Plymouth division. Dodge will be later getting started than Plymouth. The entire Chrysler organization still is committed to a program believed to call for 60,000 units during the fourth quarter. The Dodge truck plant is Chrysler's most active division at the moment.

Chevrolet Encounters Delays

Chevrolet is reported to have encountered further delays in connection with preparations for its 1935 Master series, and it seems doubtful whether assemblies will be begun before around Jan. 1. This is about 30 days later than originally contemplated. No steel has yet been placed for the new job. In fact, it is understood that a portion of the tool and die work has not yet been let. As reported earlier in this column, Chevrolet will continue to make 1934 passenger cars, principally the Standard series, well into November. Most of the current operations at the gear and axle plant, which is on a sharply



ASSEMBLY LINE

curtailed basis, are for commercial cars and trucks.

There are indications that for the first time since the standard Chevrolet was introduced early in 1933 it will not ape in its general exterior design the Master series. The latter will be strictly a "style" job in 1935. It is said that the Standard will have much the same lines as the present Master and will use its engine.

Ford is deep in change-overs for its new V-8. Reports will not down that Ford will have two lines of cars in 1935—the large V-8 and a smaller V-8. However, little credence is put in these reports by people close to the Ford organization. One should remember that the present V-8 was the medium for the renaissance of Ford sales this year, so why alter this set-up in 1935 unless something unforeseen occurs to make it necessary?

Ford Deadline is Nov. 12

Debate continues in Detroit on how much longer wheelbase the new Ford will have than the present model. It is probable that the wheelbase will be about 115 in., according to the best advices. Ford is reported to have informed parts suppliers to be ready to start deliveries Nov. 12 and tentatively has established a production schedule of 1000 units a day beginning then at the Rouge plant. It is believed that some venders will not be able to meet these demands, because their tools and dies will not be completed until about that time. In any event, Ford will push production hard so as to enlarge its volume to a fairly respectable total in December.

It is a well-known fact in the automobile industry that the company which secures a comfortable lead over its competitor in January and February, especially in the low-price field, is scarcely ever dislodged during the remainder of the year. Due to production delays and to the tool and die strike, Chevrolet went into March of this year far behind Ford in registrations and only now has succeeded, after almost eight months, in pulling up abreast. Chevrolet doesn't want to get caught in an embarrassing and costly position again early next year.

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

On the other hand, Ford is cognizant of the advantage of getting into production early. Hence considerable heat is likely to be turned on parts and materials suppliers, as well as on their own production officials, by Ford and Chevrolet in the next 60 days to make sure that neither goes into the new year at a disadvantage compared with the other.

Parts makers have expansive smiles as they contemplate 1935. Car assemblies are generally expected to be larger than in 1934 and, at the same time, more business is being farmed out by car manufacturers than in several years. Chevrolet and Pontiac are letting out more work than probably any other company. Chrysler has awarded to outside suppliers some parts heretofore made in its own plants.

In recent years General Motors has followed the procedure of having Buick announce new models first, Chevrolet second, Pontiac third and finally Oldsmobile, Cadillac and La Salle. This arrangement will be broken up so far as 1935 models are concerned. Pontiac will be first, with a six and an eight to be announced early in December. Chevrolet will be second and Oldsmobile third. Buick, La Salle and Cadillac will go through the first half of 1935 without changing models.

Packard has announced that it is spending $6,200,000 in connection with its regular 1935 series of cars, recently introduced, and with development of its light car to be put on the market early next year. This amount includes $3,500,000 for tooling of both lines of cars, $1,200,000 for engineering, $1,000,000 for machinery and equipment, and $500,000 for plant rearrangement. Of these expenditures about $5,000,000 will be charged against operations during the quarter ended Sept. 30, which will show a net loss of around $2,400,000. Indicated net loss for the first nine months of this year is $5,368,000. Cash and marketable securities on Sept. 30 were $13,000,000, compared with $15,114,017 a year earlier. Further reduction in cash position is anticipated this quarter because of necessary outlays for development of the light car.

Packard is rounding out its organization to handle the new car. W. M. Packer, formerly a Chevrolet regional manager, has become sales manager of the new division and L. W. Slack, formerly with Pontiac, will be sales promotion manager. As announced in THE IRON AGE of Oct. 4, George T. Christopher, recently factory manager at Buick, will have charge of production. Packard thus far has turned out only five-passenger sedans of its regular series.

Detroit Employment Off

Reflecting the shutdown of several motor car and parts plants, Detroit industrial employment declined 10 points in the first half of October. On Oct. 15 the index of the Board of Commerce stood at 54.1, compared with 64.2 on Sept. 30. However, the number of employed is above that of a year ago when the index figure was 48.5.

Packard is reported to have placed order covering the tool and die work for its light car which is said to have lines as radical as those of the Chrysler Airflow.

Detroit Notes

Kelsey-Hayes is reported to have been awarded a contract to furnish wheels for 1935 Oldsmobiles. . . . Chevrolet has added a four-door five-passenger sedan to its Standard line for the first time. It lists at $540, or $100 under the Master. Major feature in styling is treatment of the rear end, where body panels extend low in an unbroken contour to cover the back of the chassis. . . . In the 21 States listed in the affected area in a drought map published by the United States Department of Agriculture, new car registrations in the first eight months of 1934 increased 43 per cent over last year, whereas in the States not affected by the drought the gain was only 32 per cent.

Where Emulation of British Labor Policy Would Lead Us

THE Administration recently called attention to the more satisfactory industrial relations existing in Great Britain, leaving the implication that her example might well be followed by this country. That suggestion will get thoughtful consideration from all American industrial executives who have had an opportunity to read the British Industrial Disputes and Trades Unions Act of 1927.

If the provisions of that legislation were substituted for Section 7a of our National Industrial Recovery Act, this country would soon be rid of the major labor controversies which have been so seriously retarding business recovery.

The British act prohibits sympathetic and general strikes.

It bans mass picketing as we know it in this country.

It requires unions to make an accounting to the Government of their receipts and disbursements.

It prohibits local or public authorities from making union membership a condition of employment or continuance in employment.

It provides for no labor board with the power to compel any particular type of labor bargaining and no "majority rule" to usurp the rights of minority groups.

Excerpts from the act on specific subjects are as follows:

Sympathetic and General Strikes

1. (1) It is hereby declared—
   (a) that any strike is illegal if it—
      (i) has any object other than or in addition to the furtherance of a trade dispute within the trade or industry in which the strikers are engaged; and
      (ii) is a strike designed or calculated to coerce the Government either directly or by inflicting hardship upon the community; and
   (b) that any lockout is illegal if it—
      (i) has any object other than or in addition to the furtherance of a trade dispute within the trade or industry in which the employers locking out are engaged; and
      (ii) is a lockout designed or calculated to coerce the Government either directly or by inflicting hardship upon the community;

and it is further declared that it is illegal to commence, or continue, or to apply any sums in furtherance or support of, any such illegal strike or lockout.

For the purposes of the foregoing provisions—

(a) a trade dispute shall not be deemed to be within a trade or industry unless it is a dispute between employers and workmen, or between workmen and workmen, in that trade or industry, which is connected with the employment or non-employment or the terms of the employment, or with the conditions of labor, or persons in that trade or industry; and

(b) without prejudice to the generality of the expression "trade or industry" workmen shall be deemed to be within the same trade or industry if their wages or conditions of employment are determined in accordance with the conclusions of the same joint industrial council, conciliation board or other similar body, or in accordance with agreements made with the same employer or group of employers.

(2) If any person declares, instigates, incites others to take part in or otherwise act in furtherance of a strike or lockout, declared by this act to be illegal, he shall be liable on summary conviction to a fine not exceeding £10 or to imprisonment for a term not exceeding three months, or on conviction on indictment to imprisonment for a term not exceeding two years:

Provided that no person shall be deemed to have committed an offence under this section or at common law by reason only of his having ceased work or refused to continue to work or to accept employment.

Picketing

3. (1) It is hereby declared that it is unlawful for one or more persons (whether acting on their own behalf or on behalf of a trade union or of an individual employer or firm, and notwithstanding that they may be acting in contemplation or furtherance of a trade dispute) to attend at or near a house or place where a person resides or works or carries on business or happens to be, for the purpose of obtaining or communicating information or of persuading or inducing any person to work or to abstain from working, if they so attend in such numbers or otherwise in such manner as to be calculated to intimidate any person in that house or place, or to obstruct the approach thereto or egress therefrom, or to lead to a breach of the peace; and attending at or near any house or place in such numbers or in such manner as is by this subsection declared to be unlawful shall be deemed to be a watching or besetting of that house or place within the meaning of Section 7 of the Conspiracy, and Protection of Property Act, 1875.

(2) In this section the expression "to intimidate" means to cause in the mind of a person a reasonable apprehension of injury to him or to any member of his family or to any of his dependents or of violence or damage to any person or property, and the expression "injury" includes injury to a person in respect of his business, occupation, employment or other source of income, and includes any actionable wrong.

(3) In Section 7 of the Conspiracy, and Protection of Property Act, 1875, the expression "intimidate" shall be construed as having the same meaning as in this section.

(4) Notwithstanding anything in any act, it shall not be lawful for one or more persons, for the purpose of inducing any person to work or to abstain from working, to watch or beset a house or place where a person resides or the approach to such house or place, and any person who acts in contravention of this subsection shall be liable on summary conviction to a fine not exceeding £20 or to imprisonment for a term not exceeding three months.

Accounting to the Government

4. (6) Section 16 of the Trade Union Act, 1871, (which provides for the transmission to the Registrar of annual returns by registered trade unions), shall apply to every unregistered trade union so far as respects the receipts, funds, effects, expenditure, assets and liabilities of the political fund thereof.

Open Shop in Public Jobs

6. (1) It shall not be lawful for any local or other public authority to make it a condition of the employment or continuance in employment of any person that he shall or shall not be a member of a trade union, or to impose any condition upon persons employed by the authority whereby employees who are or who are not members of a trade union are liable to be placed in any respect either directly or indirectly under any disability or disadvantage as compared with other employees.

Recent Allotments Made by PWA

WASHINGTON, Oct. 23.—Among recent allotments announced by the PWA are the following:

New York, $548,000, loan and grant, for construction and equipping of three-story basement fireproof elementary school at 159th Avenue between Ninety-eighth and Ninty-ninth streets, Howard Beach, Queens.

New York, $503,000, loan and grant, for construction and equipping of a high pressure fire service pumping station, with screen chamber building, at Coney Island, Brooklyn.

Madison County, Ill., $335,000 grant, to State of Illinois, to aid in construction of four highway improvements, including two viaducts over railroad tracks, total cost to be $1,115,482.

Berkeley, Cal., $228,000, grant, to Berkeley High School District of Alameda County, to aid in reconstruction of several school buildings to resist earthquake forces and the construction of seven new school buildings and gymnasiums, total cost to be $825,000.

The Commissioners of the District of Columbia have signed a contract with the PWA for an $8,000,000 loan to finance the construction of a sewage disposal plant.

Upturn in Steel Production Accompanied By Scrap Rise

Ingot Output Recovers Recent Loss, Now Averaging 24½ Per Cent; Scrap Index Registers First Increase Since Last March

TRENDS in iron and steel demand are still mixed, but bookings in the aggregate have shown a slight gain, pushing steel production up one point to 24½ per cent of capacity. At the same time, scrap, as measured by THE IRON AGE composite for heavy melting steel, has advanced for the first time since March, rising from $9.50 to $9.58 a ton.

The entire market has a steadier tone, thanks to recent reassuring pronouncements of the Administration, but buying remains extraordinarily cautious, with increases attributable mainly to spot purchases to balance stocks. Even such orders are avoided in some cases by cutting material to the needed sizes.

With consumers buying only when it is imperative to do so and then only in small amounts, mill schedules have been erratic with the result that costs have mounted. In an effort to overcome this difficulty certain steel companies are now stocking larger quantities of standard products. Some stocking of material has also been done in anticipation of heavier orders from the automobile industry.

WHILE the gloom that has been hanging over the motor trade has lifted somewhat, the outlook for new model production remains uncertain. Automotive foundries are beginning to turn out castings for the new cars, but steel releases are not likely to reach the mills in impressive volume until early in November, with December delivery specified on most orders. The slowness with which the industry is getting started on its new model program will probably result in a smaller output of cars in November than in October. Indications are that assemblies next month will fall considerably short of 100,000 units.

Pending the appearance of substantial automotive buying, which is believed to be the spark needed to start a broad buying movement, the iron and steel trade remains in the grip of a procrastinator's market. Part of the conservatism of buyers is attributable to the approach of year-end inventory taking.

TIN plate production, although still holding at 40 per cent, is gradually giving way to seasonal influences. Additional contracts for the processing and canning of 421,000 heads of cattle and 210,000 calves from the drought area will mean the utilization of 10,000 tons of tin plate, part of which, however, may be supplied from canners' stocks.

Public works continue to account for most of the current demand for constructional steel and will not be a larger factor in the market until and if present housing plans of the Administration fully mature.

Structural lettings of 22,100 tons are the largest since the last week of August and compare with 8580 tons a week ago. New projects total 14,500 tons as against 14,302 tons last week. The award last week of general contracts for a section of the Colorado River viaduct will result in the purchase of 46,000 tons of steel within the next 60 or 90 days.

IN the railroad field, buying policy is being increasingly influenced by the growing interest in high-speed trains. The Milwaukee Road has bought two streamlined steam locomotives and the Santa Fe is in the market for a large Diesel electric engine. Improvement of roadbeds for these trains is also commanding attention and a number of Western roads are contemplating buying rails required for this purpose. So far as can be learned only one or two lines are likely to place large orders. While the Administration is apparently willing to finance another rail-buying program, many carriers have not yet laid the last rails they purchased. Rails in storage on only three large lines are known to total more than 150,000 tons.

Steel ingot output has risen two points to 18 per cent in Pittsburgh, four points to 28 per cent at Chicago, one point to 23 per cent in the Philadelphia district, four points to 30 per cent in the Cleveland-Lorain area and five points to 28 per cent in the Wheeling district. In the South, operations have dropped from 25 per cent to 8 per cent of capacity; in the Valleys they have receded from 28 to 24 per cent. Elsewhere production is substantially unchanged, with Detroit still leading with a 76 per cent rate.

THE IRON AGE composites for finished steel and pig iron are unchanged at 2.124c. a lb. and $17.90 a ton.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Oct. 23, 1934	Oct. 16, 1934	Sept. 25, 1934	Oct. 24, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$18.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	18.13
No. 2, Birmingham†	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.	19.76	19.76	19.76	17.76
Basic, Valley furnace	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.76
Malleable, Chicago*	18.50	18.50	18.50	17.50
Malleable, Valley	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.54
Ferromanganese, seab'd carlots	85.00	85.00	85.00	82.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.75
Bars, Chicago	1.85	1.85	1.85	1.80
Bars, Cleveland	1.85	1.85	1.85	1.80
Bars, New York	2.13	2.13	2.13	2.08
Plates, Pittsburgh	1.80	1.80	1.80	1.70
Plates, Chicago	1.85	1.85	1.85	1.75
Plates, New York	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.70
Structural shapes, Chicago	1.85	1.85	1.85	1.75
Structural shapes, New York	2.05¼	2.05¼	2.05¼	1.95¼
Cold-finished bars, P'gh	2.10	2.10	2.10	1.95
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

Finished Steel

Per Lb.	Oct. 23, 1934 Cents	Oct. 16, 1934 Cents	Sept. 25, 1934 Cents	Oct. 24, 1933 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh	2.60	2.60	2.60	2.10
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.15
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., Pittsburgh	3.00	3.00	3.00	2.60
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.65
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$4.65

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$10.50	$10.25	$10.75	$11.75
Heavy melting steel, Phila.	9.50	9.50	9.50	10.00
Heavy melting steel, Ch'go	8.75	8.75	8.25	9.00
Carwheels, Chicago	9.50	9.50	9.50	9.50
Carwheels, Philadelphia	10.25	11.25	11.25	11.75
No. 1 cast, Pittsburgh	11.25	11.25	11.75	11.75
No. 1 cast, Philadelphia	10.75	11.75	11.75	11.50
No. 1 cast, Ch'go (net ton)	8.00	8.00	8.00	9.50
No. 1 RR. wrot., Phila.	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net)	7.00	7.00	6.75	7.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$3.75
Foundry coke, prompt	4.60	4.60	4.60	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	7.50
Lake copper, New York‡	9.12½	9.12½	9.12½	8.00
Tin (straits), New York	51.25	50.95	51.50	48.12½
Zinc, East St. Louis	3.85	3.80	4.00	4.75
Zinc, New York	4.20	4.15	4.35	5.12
Lead, St. Louis	3.55	3.45	3.50	3.90
Lead, New York	3.70	3.60	3.65	4.00
Antimony (Asiatic), N. Y.	9.50	9.50	8.75	6.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
Oct. 23, 1934	2.124c. a Lb.	$17.90 a Gross Ton	$9.58 a Gross Ton
One week ago	2.124c.	17.90	9.50
One month ago	2.124c.	17.90	9.50
One year ago	2.015c.	16.61	10.25

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1934	2.199c., April 24	2.008c., Jan. 2	$17.90, May 1	$16.90, Jan. 27	$13.00, Mar. 13	$9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Production Rises Two Points to 18 Per Cent

Wheeling Rate Is Up Five Points to 28 Per Cent But Valley Operations Drop to 24 Per Cent—Scrap Advances 25c.

PITTSBURGH, Oct. 23.—Steel buying in this district continues to be spotty. The market, however, still reflects a rather cheerful tone. Consumer interest is broadening as a result of the stabilizing effects of recent pronouncements on price from Washington. Just when this interest will be translated into actual orders for steel is difficult to predict.

Long awaited automotive buying is believed to be the spark necessary to start a broad purchasing movement. A few orders for sheets and strip from automotive centers fail to provide assurance that large-scale covering is at hand, and steel producers are now pinning their earliest hopes for support from that quarter on the turn of the month.

Railroad buying in this district is barely kept alive by spot track accessory orders. There is yet no indication that any major rail purchases for 1935 requirements are in the making. Constructional demand continues to fluctuate in line with public works appropriations from week to week.

In the case of miscellaneous consumers purchases generally are being delayed until steel is actually needed. This policy of hand-to-mouth buying is expected to rule quite generally for the remainder of the year and will be more rigidly adhered to as consumers approach year-end balance sheets.

A two-point rise in ingot output at Pittsburgh this week to 18 per cent of capacity is traceable chiefly to mill replenishment of semi-finished and standard grades of steel products. In the Wheeling district operations are five points higher at 28 per cent. Production in the Valleys and nearby northern Ohio mills is down four points to 24 per cent. No. 1 heavy melting steel at Pittsburgh has advanced 25c. a ton in a generally firm scrap market.

Pig Iron

The long-term program for reequipping freight cars with a new type of air brake has not thus far been translated into sizable pig iron orders. The market generally is quiet. Although in scattered cases foundry melts have been increased, there is no definite uptrend in activity. Demand from mold makers is disappointing. The increased differential on various grades of pig iron with silicon under 1.75 per cent will make very little difference in this district, since there is only one important consumer of gray forge iron. The present quotation for gray forge, based on the higher differential, is $18, Neville Island, Pa.

Semi-Finished Steel

A slight increase in sheet bar demand from detached sheet mills has been offset by a declining interest from tin plate mills. Forging billets are in better favor. Demand for skelp and wire rods has leveled off. Prices appear to be firmer than was the case a month ago.

Bolts, Nuts and Rivets

A fair share of orders recently placed by the Navy Department reached producers in this district. Otherwise new business has been unusually light. Price weakness occurring in the past week on bolts and nuts has resulted in establishment of discounts of 70, 10, 10 and 10. The market is still in a nervous condition, and it is difficult to determine whether bolt and nut prices have reached bottom. The industry still is without benefit of code. On the other hand, bolt and nut makers are paying prices for steel and raw materials stabilized by codes. Hence the recent weakness in this market may serve to hasten the stabilizing of bolt and nut prices through codification.

Bars

While demand for soft steel bars is running ahead of other heavy hot-rolled steel products, weekly bookings manifest no encouraging trend in consumption. With most cold-finishing mills operating on reduced schedules, the soft steel bar market lacks one normally steady outlet. The movement to reinforcing bar fabricators has declined. Automotive tonnage, while momentarily expected to improve, has not thus far pointed definitely upward.

Reinforcing Steel

The lion's share of the 1700 tons specified for the Tygart Valley dam in West Virginia is now expected to go to rail steel mills. Other important projects in the Tri-State area are few. The ambitious State road program of Pennsylvania will probably not return actual orders to mills until next spring, since road construction is now beginning its seasonal decline.

Cold-Finished Bars

Orders are being placed with less freedom, but producers expect that the market will soon be enlivened by substantially heavier demand from automotive centers. Thus far, however, even preliminary interest is well guarded. A bright spot is a moderate demand from agricultural implement makers. Jobbers are merely piecing out stocks and are adding little to present activity.

Plates and Shapes

The United States Engineer Office at Jacksonville, Fla., has taken bids on two 60-ft. barges and two or four 75-ft. barges, which will require a moderate quantity of plates. Barge yards in the Pittsburgh district are practically inactive, with little relief in sight in the face of the winter season. The structural steel market remains quiet. Awards in the past week reported here were the smallest in the aggregate in several months. New inquiries are likewise limited and offer little hope for early substantial aid to mill back-logs. Structural mills in this district are in some cases fairly well engaged on old orders.

Wire Products

The recent improvement in demand for manufacturers' wire has not been sustained. Early benefit to this class of wire goods, however, is expected from the automotive industry. Consumption in agricultural districts, as a whole, offers no unusual feature except that calls from the South and the Southwest predominate over those from other farming regions. The merchant trade is generally quiet, with jobbers not inclined to augment present stocks beyond special fill-in lots. Wire mills' operations this week will likely remain at around 20 per cent.

Tubular Products

Producers are leaning heavily on demand for oil country goods and standard pipe. Support from other tube consuming sources is very weak. The market is practically bare of any specific major line pipe project. Mechanical tubing is not moving any more freely to automotive centers, although demand for application to new models is momentarily expected to appear. Railroad demand for locomotive boiler tubes is at a low point.

Sheets

Improvement in general demand is difficult to discern. Scattered increases in automotive tonnage have not added noticeably to general activity. Miscellaneous demand is barely holding its own. A moderate movement is in progress to electrical equipment

manufacturers, while a seasonal flurry is reported in demand for sheets for alcohol and non-freeze liquid drums. Galvanized sheets are in only fair demand for agricultural districts, while metal furniture sheets are very quiet.

Tin Plate

Contracts to process 421,000 additional head of cattle and about 210,000 more calves from the drought area into canned beef and veal for the needy unemployed have been let by the Federal Surplus Relief Corpn. It is estimated that about 10,000 tons of tin plate will be required for manufacturing containers for this meat. Whether the full requirements, however, will be translated into new orders for tin plate is problematical, since most large canners are attempting to liquidate present stocks so far as possible, but some new tonnage will probably find its way into the market. General specifications continue their seasonal decline and except in one or two cases rolling on anticipatory specifications against next year's tonnage is aiding schedules very little. Some plate, however, is being produced for stocking, and the industry will probably hold to a 40 per cent average for this week.

Strip Steel

Automotive demand has not appeared in a large way, but small orders for new models are increasing. There are also in evidence small fill-in lots being taken for final production on 1934 motor cars. Demand from other sources lacks feature. Some encouragement is taken from the wide variety of strip demand.

Coal and Coke

While domestic demand for screened sizes is increasing, resultant slack accumulations are rising. No relief for this problem is offered by industrial users, whose interest continues to be very limited. There is some talk of a possible price inducement to move slack, but with minimum prices fixed under code authority some producers question the advisability of disrupting a generally stable price situation. Demand for foundry and furnace coke is slightly improved.

Scrap

Recent sales of No. 1 heavy melting steel reflect a relatively wide range of prices. Moderate quantities of that grade have been sold at $10.25 to $11. However, with the bulk of recent transactions going at an average of $10.50, delivered, the quotable range has advanced moderately to $10.25 to $10.75. Corresponding increases have been made in other steel-making grades. Stronger dealer bidding for No. 2 heavy melting steel has pushed the price up 50c. a ton to $9.50 to $10. Railroad specialties are strong on an advance of 50c. a ton. Although the entire scrap market reflects a definitely firm tone, it still lacks assurance of a sustained consumer demand. It is generally conceded that more rapid enhancement in scrap values must await a steady, measurable increase in mill operations.

Blast Furnace Taken Off at Buffalo

BUFFALO, Oct. 23.—Buffalo district blast furnace operations have been curtailed by one unit, the Hanna Furnace Corpn. having reduced to one furnace. The stack which went out was on silvery. More activity has been apparent in the pig iron market lately, with the boiler and radiator industries in the middle of their season. No sizable inquiries are out but occasionally a round tonnage is quietly placed. Buyers for the first time in a long period are buying ahead more freely. This is interpreted by some as constituting a hedge against possible inflation.

Steel production is running along about the same as before. The Lackawanna plant of the Bethlehem Steel Corpn. is operating five open-hearths, Republic Steel Corpn. has three active, and Wickwire-Spencer, one. The Seneca sheet division is operating slightly better this week—20 per cent of capacity.

A Buffalo fabricator has been awarded 180 tons for a brewery in Utica, N. Y., and 200 tons for a State highway bridge near Holland, N. Y. Another will fabricate 130 tons for a State highway bridge at Gowanda, N. Y.

Steel warehouse business is reported fairly good, with sheets moving very well. A number of changes in warehouse prices have been made.

New York brokers who have unlimited scrap orders for export to Japan, Poland, England and Italy, have made tentative inquiries in this district with the idea of shipping export scrap from here. One dealer offered to sell 1000 tons of No. 1 heavy melting steel at $10.50 his yard, but the prospective purchasers apparently felt that the rail charge and the lighterage charges would consume most of the profit. Other dealers, it is understood, offered to sell for $10.75 under the same arrangement. Most of them held out for $11, their yards. A generally firmer attitude is discernible in the scrap market, due largely to the fact that incoming water shipments will be discontinued within a month or so. It is doubtful if a tonnage of No. 2 heavy melting steel could be bought for less than $9.50 or $10 or No. 1 for less than $11.

Attempts are being made, it is understood here, to obtain a freight rate on export scrap from Buffalo to New York of $2.45 a ton as against the $5.41 rate at the present time. Approximately 500 tons of No. 1 machinery cast has been sold for $10.75, delivered frontier point.

General Contracts Placed For Coast Aqueduct

SAN FRANCISCO, Oct. 22.—Awards of general contracts for the construction of 110 miles of the Colorado River aqueduct have been announced at Los Angeles by the Metropolitan Water District. The 16 schedules, divided among seven groups of bidders, call for an expenditure of $14,126,175, to which will be added $10,937,511 for materials and supplies. Approximately 45,750 tons of steel will be purchased by the district within the next 90 days. A minimum of 12,000 tons of steel will be required under Specification No. 75, on which bids are to be received Oct. 31.

The fifteenth annual convention of the California section of the American Water Works Association is being held the last four days of the week at Long Beach. The program lists outstanding speakers on all phases of water work construction and management. Of particular interest will be an exhibit of products of 45 metal and electrical manufacturers.

Structural bookings during the week were more numerous, although reinforcing bar awards were limited. Pacific Coast Steel Corpn. took 500 tons of structural steel for an auditorium at San Jose, Ca., while, in the Northwest, Poole & McGonigle and Virginia Bridge & Iron Co. were awarded 175 tons and 224 tons of structural steel respectively. Soule Steel Co and Truscon Steel Co. booked 170 tons and 200 tons of reinforcing bars at San Francisco and Los Angeles. Oakland, Cal., awarded 650 tons of cast iron pipe to National Cast Iron Pipe Co.

Although few new projects were listed during the week, a number of contracts requiring major tonnages are under advisement. Bids should be called before the first of the year for additional work at Bonneville dam, including 18 gates and a powerhouse superstructure.

Ohio River Iron and Steel Movement Holding

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in September amounted to 45,848 net tons, compared with 45,840 tons in August, 60,005 tons in July, and 38,480 tons in September, 1933, according to the latest report of the United States Engineer Office, Pittsburgh. Total movements of steel products on the Monongahela River in September were 35,411 tons, compared with 32,412 tons in August, and 43,026 tons in September, 1933. Shipments of iron and steel on the Allegheny River last month totaled 3750 tons.

Chicago Output Is Up Four Points to 28 Per Cent

Part of Gain Is Attributable to Anticipatory Stocking of Semi-Finished Steel—Automobile Foundries Melt More Iron

CHICAGO, Oct. 23.—A more active market is reflected by ingot output, which has risen to 28 per cent of capacity. This is a gain of four points, which more than makes up the two-point loss of a week ago. The increase, however, is not due wholly to an upward swing in business. The producer responsible for adding the largest number of open-hearths is admittedly making some semi-finished steel for the bank.

Shipments of pig iron reflect more activity in automobile centers, though jobbing foundries in this area also are doing somewhat better. The outlook as to railroad buying is better, though spotty, and is not yet of such a character as to promise large mill bookings. Seventy-five tank cars have been ordered and the Milwaukee Road has bought two streamlined locomotives. The Santa Fe is about ready to experiment with a high-powered Diesel electric to haul its crack train, the Chief, between Chicago and the Pacific Coast.

A slightly better volume of wire orders is flowing to mills, and structural specifications are larger.

Pig Iron

Automobile foundry units in Michigan are definitely on the upgrade and jobbing units in the Chicago area are enjoying better business. Although no contracting is going on, many buyers who contracted in June are again in the market on a week-to-week basis. Two merchant stacks remain lighted in this district.

Warehouse Business

Demand out of warehouse has been steadily climbing since about the middle of September. October will be one of the best months of the year and stands a chance of being the best should the number of orders remain at the high level reached within the last week. Orders are consistently upward both from cities and rural areas. Structural rivets are now quotable at 3.65c. a lb., and boiler rivets are priced at 3.75c. a lb.

Cast Iron Pipe

Although PWA projects provide the bulk of business, still miscellaneous spot sales of cast iron pipe are in satisfactory volume, all things considered. Bids will be opened in the next 10 days in Illinois on at least 10 PWA jobs. Some of the old projects of like character are dragging and the trade places most of the blame on municipalities that are slow in preparing final plans and often leave legal matters in an unfinished condition. Benld, Ill., has opened bids on 1000 tons of pressure pipe.

Reinforcing Bars

Architects and contractors are disturbed by the sweep of injunctions that are being sought against PWA projects by citizens whose wrath is rising against heavier community debt. Chicago has plans for new public school buildings and is making another attempt to get Government aid to complete the Outer Drive bridge which will require a round tonnage of reinforcing bars.

Wire Products

District offices are now not only reporting better feeling among buyers but some added tonnage is actually reaching mills, which have stepped up output about one and one half points to an average of 27 per cent of capacity. Business is better in automobile manufacturing areas and improvement is reported from Kansas City. St. Louis remains steady and Texas orders have fallen off in the last week. Reports from various centers show that the furniture business is better and mills are looking for spring wire business from that direction.

Cold-Rolled Strips

Orders remain sluggish as many users stand by to watch developments in prices which many of them think are weak. They base their opinions on the competition between cold rolled sheets and strip, and the price differentials between them. Many users and some jobbers are using slitters on sheets.

Sheets

The big play in this market is coming from automobile manufacturers who have released orders at local mills. At the same time at least one mill is building up stocks of semi-finished materials based on its appraisal of sheet demand in the near future. There are still sizeable stocks in users' hands. That they are out of balance means little because off sizes are being cut to needed sizes as an inventory reducing practice. The price advance that did not materialize carried consumers inventories to top-heavy proportions.

Plates

Activity in railroad equipment adds some zest to this market. The Corn Products Refining Co., has ordered 75 tank cars from the General American Transportation Co. and the Milwaukee Road has ordered two streamlined locomotives, one to be delivered for experimental runs. The Santa Fe may place an order for a 3600-hp. Diesel electric locomotive and the Illinois Central is on the verge of ordering 11 Diesel electric switch engines. Miscellaneous plate tonnages are scarce.

Bars

Agricultural implement manufacturers still lead in the use of bars and not a week goes by without some growth in their needs. There is some automobile bar buying in evidence though local mills believe that a week, or even two weeks, may pass before quantity tonnages will be placed. Miscellaneous consumption remains spotty and has shown no material change in over a month.

Structural Material

Awards total 5000 tons, of which the vast bulk is for public works. Fresh inquiries total 8300 tons, over half of which is for public works in California, which at this time seems to be badly in need of schools, hospitals, pier sheds, municipal auditoriums and the like. Plans for the Winona, Minn., dam across the Mississippi River that were to have been out by this time have been delayed because of last minute changes.

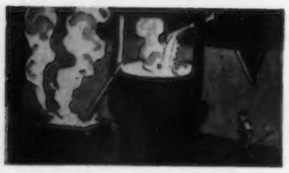
Rails

One of the most important factors now influencing the study of rail requirements is the turn to high-speed trains and the improvement of road beds so that they can be operated with safety. It is known that a number of budgets contain allowances for rails which will not be announced until these budgets have been signed by railroad directors.

Scrap

Mill acceptances are at a higher rate, but otherwise the market is drab. Offerings are at a good level, especially in hydraulic bundles which dealers can now buy for 25c. a ton less than a week ago. Brokers consider that two local mills are out of the market for the remainder of the year, whereas other mills are buying only small lots that point to their desire to help dealers crowded with scrap appearing on track.

Cleveland Rate Up Four Points to 30 Per Cent



But Gain in Production Has Not Been Accompanied by an Increase in Bookings —Better Automotive Demand Looked For

CLEVELAND, Oct. 23.—No upward trend in the demand for finished steel is in evidence, and producers are now looking forward to November with the belief that there will be a substantial revival of demand from the automotive industry during the coming month. A great deal of business in automobile stampings and forgings for new models is being figured on by shops in this territory, but few, if any, of the parts plants that have already taken orders have secured releases for shipments.

In spite of the failure of steel orders to gain, ingot output in the Cleveland-Lorain territory again increased this week. there was a gain of four points to 30 per cent of capacity due to the starting up of two additional open-hearth furnaces in Lorain, where eight are now operating. Operations at Cleveland steel plants have not changed since the middle of September.

The October volume of steel business in this territory will show a slight gain over September, according to present indications. The larger consumers who ordinarily place round tonnages when business is normal are restricting their purchases to immediate needs and most orders from these plants are for less than car lots. There is an improved demand for structural shapes for small industrial buildings usually taking less than a car lot of steel. Railroads are doing considerable bridge repair work, but the aggregate amount of steel required is small. No sizeable tonnage of steel is expected during the remainder of the year from railroads centering here.

Pig Iron

The recent improvement in sales and shipments is being maintained, and producers look for further gain in November when automobile foundries are expected to get under production on castings for new models. Hand-to-hand buying is still the rule, the largest order placed during the week being for 300 tons. Some business is coming from foundries that have taken no iron since June, which indicates that their stocks are becoming exhausted. There has been little pick-up in the jobbing foundry industry.

Bars, Plates and Shapes

In the absence of orders from the automotive industry demand continues slow both for plain carbon and alloy steel bars. One of the Michigan automobile companies will place its camshafts and connecting rods for its new models with a Cleveland and a Fremont forge shop, according to reports from Detroit. Heretofore these have been made in the forge shop of an affiliated company. Structural awards include a local industrial building and a blimp hangar in Washington for the Goodyear Tire & Rubber Co., both taking less than 300 tons and being placed with local fabricators. The State highway department has set Nov. 16 as the tentative date for taking bids for the Lorain Avenue bridge, Cleveland, requiring 2000 tons or more of shapes.

Sheets

Orders show no gain, as the expected improvement in the demand from the automotive industry has not yet materialized. While some automobile tonnage is coming out, it is all in small lots for rounding out stocks in the present cleaning up of production on old models. Stamping plants in this territory have not yet placed sheets for automobile parts for which they recently have taken orders, evidently not yet having received releases from the automobile manufacturers.

Strip Steel

With very little tonnage coming from the motor car industry, new demand for both hot and cold strip is very light, although releases are coming from some of the automobile parts plants against orders recently placed. There is little miscellaneous demand. Cold rolling plants that buy hot-rolled strip are inactive.

Bolts, Nuts and Rivets

The additional 10 per cent reduction on bolts and nuts to 70, 10, 10, 10 per cent off list is expected to result in a stabilization of prices, which was not accomplished by the 19 per cent reduction in September. Price irregularities since the previous cut led to the further reduction. Keen competition has resulted in a very unsettled price situation on cap and set screws. These have been marked down about 10 per cent, but the price structure evidently has not been stabilized by this reduction.

Iron Ore

Stocks at furnaces and Lake Erie docks on that date were 29,713,032 tons and furnace and dock stocks 34,913,857 tons. Ore consumed in September amounted to 1,236,392 tons, a decrease of 207,551 tons from August. In September last year the amount consumed was 2,102,076 tons. Central district furnaces melted 657,807 tons in September, a decrease of 84,856 tons from the previous month. Lake front furnaces used 572,876 tons, a decrease of 122,407 tons. All-rail furnaces melted 5212 tons, a decrease of 218 tons and Eastern furnaces consumed 496 tons, a decrease of 70 tons.

Scrap

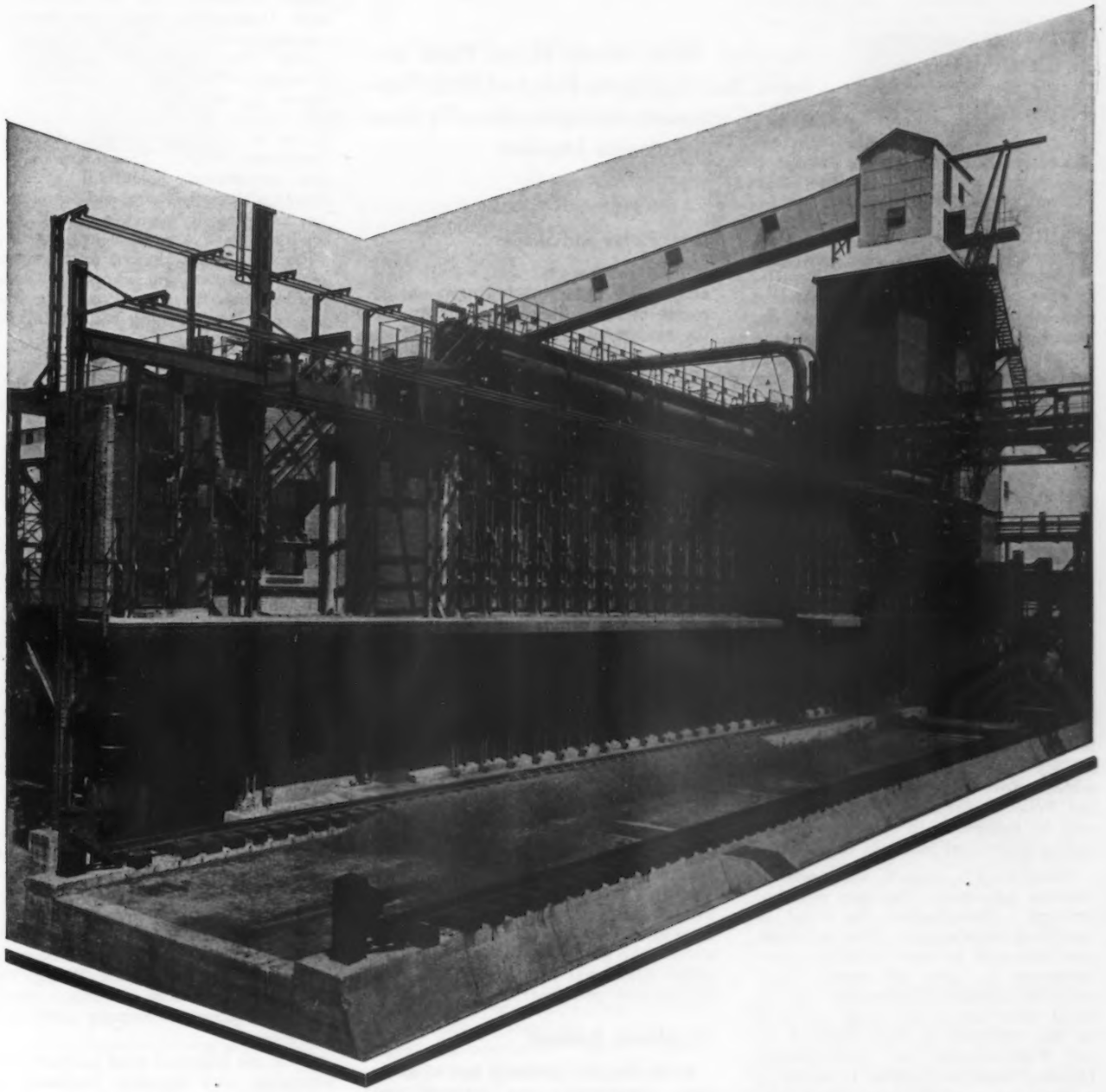
A local steel plant which has taken no scrap for two months has released a round tonnage of blast furnace scrap that had been held by dealers on Detroit docks. This consumer evidently has no immediate need for this scrap but will take it in before the close of navigation. There is no new local demand. Youngstown district mills continue to take scrap with regulated shipping schedules and dealers are buying some scrap for shipment against these orders, paying $10 to $10.25 for No. 1 heavy melting steel, $9.25 for No. 2 and $9.50 to $9.75 for compressed sheet steel. Local prices are unchanged.

Universal Power Shovel Corpn., 6200 West Burnham Street, Milwaukee, has completed its reorganization as a separate and independent manufacturer of power shovels, cranes, pull-shovels and dragline excavators, severing the previous association as subsidiary of Unit Corpn. of America, Milwaukee. J. Seton Gray, well known in the Middle West as an executive and business counselor, has been elected president and general manager.

German imports during August fell 20 million marks to 343 million marks, whereas exports increased 13 million marks to 334 million marks. The adverse August balance receded to nine million marks from 42 million in July. Negotiations are now under way between Poland and Germany regarding the conclusion of a commercial treaty.

Welding Rods and Electrodes.—Rich Mfg. Co., Ltd., 3851 Santa Fe Avenue, Los Angeles. Booklet describing company's line of welding rods and electrodes for strength and overlay welding of all types of ferrous and non-ferrous alloys.

IT PAYS TO MODERNIZE



Becker Type Oven Plants . . . . Gas Producers . . . . Water Gas Plants . . . . Liquid Purification Plants . . . . By-Product Equipment . . . . Material Handling Plants . . . . Phenol Removal Plants, Benzol Plants, etc.

KOPPERS CONSTRUCTION COMPANY

KOPPERS BUILDING PITTSBURGH

Operations Up One Point to 23 Per Cent at Philadelphia

Seasonal Boiler Work Helps Plate Demand, But Aggregate Finished Steel Tonnage Continues Unimpressive—Pig Iron Releases Improve

PHILADELPHIA, Oct. 23.—Orders for finished steel are somewhat more frequent. The November-December outlook, however, is dependent almost wholly on miscellaneous demand as little in the way of heavy tonnages is expected from railroads and shipbuilders. Local jobbers are purchasing more heavily for stock, but there is little likelihood that either jobbers or consumers will expand their stocks to any extent in view of the approaching inventory period.

The melting activity of the largest producer in this district is sufficiently heavier to advance the district operating rate one point to 23 per cent. The smaller independent producers are contributing about 25 per cent of the area's tonnage, and, in general, their rolling schedules are sufficient to take care of open-hearth production. One plant is taking ingots from stock, and a small shape mill is operating at Pencoyd with the possibility that another mill may be added before the week-end. However, the Pencoyd furnaces now operating may be staggered in the near future unless additional business develops.

Plate sellers report that miscellaneous aggregate tonnages are improving. Nevertheless the total is far from satisfactory. The railroads are estimated to have sufficient commitments to cover all repair work until the middle of November. Structural mills have a few large projects in this territory to look forward to, but Pennsylvania and New Jersey highway work is expected to result in a fair number of smaller lettings during the next two months.

Pig Iron

Orders for November and December shipment are noticeably better, and present shipments likewise are somewhat heavier than a month ago. Several furnace representatives estimate that current deliveries are around 45 per cent of normal. The fresh demand now in the market is of a miscellaneous character and is more a result of the gradual depletion of foundry stocks than a reflection of additional foundry business.

Bars, Plates and Shapes

This market is temporarily less active but potential business should result in more liberal awards during the next month. Bids were closed today on a bridge at Suffolk, Va., which involves about 200 tons of shapes, 200 tons of bars and a fair tonnage of piling. Pennsylvania is taking tenders until Nov. 2 on a bridge at Leechburg which will require 1300 tons of shapes. The E. R. Moorehouse Co., Camden, N. J., is low bidder on the Delaware River Bridge approach and that company is expected to release the 780 tons of structurals and 700 tons of contact rails within the next fortnight.

Sheets

One radio maker has placed several small tonnages, but automobile body builders and other users are discouragingly disinterested in fresh commitments. There is a little routine business which consists mostly of refill orders on certain sizes to round out stocks, and a local fabricator has purchased some stainless material for Navy work. In addition steel perforating shops are enjoying more business as a result of a number of orders received from anthracite coal screening plants. It is possible that automobile stamping plants may purchase additional supplies to clean up the current model cars.

Warehouse Business

Early October demands are of moderate proportions but activity has tapered considerably within the last week. Current business consists largely of corrugated sheets for roofing, repairs and new construction. Cold-rolled strip is in fair demand from local radio makers.

Imports

The following iron and steel imports were received here last week: 5300 tons of chrome ore from Greece, 156 tons of pig iron from British India and 49 tons of iron ore from Germany.

Scrap

One broker has paid as high as $8.75 for No. 2 heavy melting steel for delivery at Phoenixville, Pa., but the transaction has not advanced the market in this area. Except for a few purchases of machinery and heavy breakable cast for Harrisburg and Coatesville, Pa., the domestic market continues to be practically inert. One favorable development, however, is the reappearance of Bethlehem in the Baltimore market for No. 1 and No. 2 steel at $8.50 and $7.50 a ton respectively, delivered Sparrows Point. These grades are not particularly plentiful at such prices although several thousand tons are expected to be picked up. Export loadings here are as heavy as ever with two boats docked and several more expected in shortly. Some grades other than heavy melting steel are occasionally being bought for domestic delivery.

Sharp Curtailment of Southern Output

BIRMINGHAM, Oct. 23.—Steel production will be sharply curtailed this week. On Sunday the Tennessee Coal, Iron & Railroad Co. shut down its Fairfield works for the week. Only the blast furnace will continue to operate, and this has been changed from basic to foundry iron. Work is scheduled to be resumed next week.

With the Fairfield open-hearths down, only two out of 24 units in the district are in production this week. For some time past the total had been six. The two active are at the Alabama City works of the Gulf States Steel Co.

Blast furnace operations were also reduced during the past week. Republic Steel Corpn., which for a number of weeks has been the only company on a two-furnace schedule, blew out its No. 2 furnace last Thursday for relining. The active blast furnace total now is four, with Woodward Iron, Sloss-Sheffield, Republic Steel and the Tennessee company each having one.

Both the iron and steel markets are dragging and current business is small. Pig iron demand is largely on a spot basis. About the only activity in the steel market is furnished by sheets and wire products. This is still restricted and far below expectations. October pig iron shipments will exceed those of September, but this doesn't mean much, as September was a poor month.

Pressure pipe continues to follow a steady course. Lettings this month have been about equal to those of September. Both new bookings and shipments will be close to the totals of last month. The outlook for November is just as good.

Steel Bookings in Upturn In New York District

Orders for Galvanized Sheets and Tin Plate Improve — Milwaukee Road Places Two High-Speed Streamlined Locomotives

NEW YORK, Oct. 23.—The tone of the iron and steel market has improved materially. Bookings in the lighter lines, particularly galvanized sheets and tin plate, have picked up markedly. Business in heavier rolled products still lags, although it continues to show a slow gain over previous months. Most commitments are to fill in holes in inventories which have finally been reduced to the point where some replenishment is necessary. Both jobbers and manufacturing users of steel are among current buyers. However, there is no incentive to build up stocks beyond current requirements and the approach of year-end inventory taking will make buyers increasingly conservative.

Eastern railroads have placed fair orders for rolled steel wheels, but are otherwise inactive in the market. However, the Chicago, Milwaukee, St. Paul & Pacific has ordered two streamlined, high-pressure steam locomotives from the American Locomotive Co. The engines are rated at 115 miles an hour and weigh 120 tons each without tenders. General contract bids on the largest pending local construction job, the Federal office building and post office, have again been postponed, this time to Nov. 9. Upward of 17,000 tons of structural steel and 500 to 1000 tons of sheet piling are involved. Tenders will be received on a tuberculosis hospital at Jersey City, involving 4000 tons, Nov. 8.

Pig Iron

Furnace representatives report better interest among melters. This improvement is reflected in expanding sales as shown by total bookings of 2000 tons in the past seven-day period, as compared with 1850 tons a week ago and 1200 tons sold in the period two weeks earlier. It is improbable, however, that weekly commitments will far exceed the 2000-ton mark unless higher prices should be threatened for first quarter deliveries. So far the trade has heard no rumors concerning prices, but the general sentiment is that there is no danger of an upward movement. Contrary to rumor, the Troy furnace has not been banked, although such action is likely near the end of November when water shipments are cut off.

Reinforcing Steel

This territory continues to derive most of its activity from the highway awards of nearby States. Kalman Steel Corpn. will furnish 650 tons of mesh for projects in Dutchess and Chemung Counties, N. Y., and the American Steel & Wire Co. was awarded about 500 tons of mesh for an airport at Providence, R. I., and a highway section at Fairfield, Conn. Pending projects approximate 1000 tons. Lettings today at Albany, N. Y., cover about 450 tons of bars and mesh, an additional 300 tons will be let a week from today, and about 400 tons is expected from other States in this area.

Scrap

Export loadings are temporarily lighter this week, but buying for shipment abroad is soon expected to again reach the average level of last month. Brokers are accumulating stocks of No. 1 and No. 2 heavy melting steels for boats expected in shortly, and some steel and cast grades are currently being loaded for Italy. All prices are quotably unchanged and quite firm. Domestically there is little to interest the scrap trade. No new orders have developed in eastern Pennsylvania, and brokers here anticipate no significant inquiries to appear within the next two weeks.

Sharp Rise in Sheet Demand at Cincinnati

CINCINNATI, Oct. 23.—Increased production by automobile and refrigerator manufacturers has stimulated sheet demand, raising mill output in this area to about 50 per cent of capacity. The recovery in demand was so sharp that there is already a feeling that business activity in the next few weeks may approach the year's peak demand of the second quarter. Users are not heavily stocked and any stimulation of consumption of finished steel products will be reflected in enlarged mill business. The leading district interest is maintaining about a 30 per cent operation at Middletown. Current business will warrant improved rolling schedules in all units of the company.

With pig iron inventories dwindling, melters are buying in increasing number for spot needs. Substantial orders, however, are lacking, buyers taking only carload lots. Inquiry is almost non-existent, since price schedules are steady. The melt is unchanged.

Seasonal influences are stimulating domestic coke demand, but foundry grades are sluggish. New business for foundry grades is for needs and fails to reflect any market trend.

A scrap list of the Louisville & Nashville was withdrawn in large part last week after the receipt of bids. Of 50,000 tons offered, only one item—10,000 tons of rails—was sold. Mill demand is negligible. Dealers are laying some old material in their yards at a price, but little scrap is moving except in small lots for urgent needs.

Sizable Bridge Award In St. Louis Area

ST. LOUIS, Oct. 23.—Public works still occupy the center of the stage so far as construction activities in this area are concerned. Stupp Brothers Bridge & Iron Co. has been awarded 2500 tons of structural steel for the superstructure of the Lake of the Ozarks bridge in Camden County, Mo., and the general contract for the substructure has been awarded to W. A. Ross Construction Co., Kansas City, Mo. McCormack-Combs Construction Co., St. Louis, is the low bidder on the general contract for the Hampton Avenue Viaduct here, requiring 600 tons of reinforcing bars and 200 tons of structural steel. Ingalls Iron Works has been awarded 10 pontoons for the United States Engineer's office here, requiring 180 tons of plates.

The demand, generally, for finished iron and steel is quiet. But the outlook is regarded as promising, in view of the fact that stocks in hands of fabricators, manufacturers and jobbers are said to be low.

The scrap market is quiet. Very little material is being offered. Dealers, however, are more hopeful that consumers are nearing a point when they will soon enter the market. Short sales are said to be about cleaned up, and there are only a few price changes, railroad springs, No. 2 railroad wrought and rails for rolling being 50c. a ton lower.

Sales of pig iron continue to consist mostly of carload lots, the number of which have been fairly large. The melt of the jobbing foundries continues to increase.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	Base per Lb.
F.o.b. Pittsburgh		1.80c.
F.o.b. Chicago		1.85c.
F.o.b. Gary		1.85c.
F.o.b. Duluth		1.95c.
Del'd Detroit		1.95c.
F.o.b. Cleveland		1.85c.
F.o.b. Buffalo		1.90c.
Del'd Philadelphia		2.09c.
Del'd New York		2.13c.
F.o.b. Birmingham		1.95c.
F.o.b. cars dock Gulf ports		2.20c.
F.o.b. cars dock Pacific ports		2.35c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.80c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston	59.00
F.o.b. cars dock Pacific ports	68.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.985c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.005c.
Del'd New York	2.0525c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.25c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.55c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate *Base per Box*

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate
(F.o.b. Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

	To Manufacturing Trade Per Lb.
Bright wire	2.30c.
Spring wire	3.20c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $3 a ton over Pittsburgh (except for woven wire fence at Duluth which is $5 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On manufacturers' wire prices at Pacific ports are $9 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also $9 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are $6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

Bale Ties, Single Loop

	Base per Net Ton
F.o.b. Pittsburgh	$63.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	63.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+9	1½+13
¼ to ⅜	53½	35	¼&⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1&1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼&⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3¼ in. o.d.	11 B.W.G.	25.22	22.93
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.94

Extras for less-carload quantities:
25,000 lb. or ft. to 39,999 lb. or ft. 5 %
10,000 lb. or ft. to 24,999 lb. or ft. 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. 25 %
Under 2,000 lb. or ft. 40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1¼ in. o.d.	13 B.W.G.	$ 9.73
1¾ in. o.d.	13 B.W.G.	11.06
2 in. o.d.	13 B.W.G.	12.28
2¼ in. o.d.	13 B.W.G.	13.79
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.56
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.66
4½ in. o.d.	10 B.W.G.	35.22
5 in. o.d.	9 B.W.G.	44.35
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:
40,000 lb. or ft. base
25,000 lb. or ft. to 39,999 lb. or ft. plus 5 %
10,000 lb. or ft. to 24,999 lb. or ft. plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. plus 25 %
Under 2,000 lb. or ft. plus 40 %

CHARCOAL IRON BOILER TUBES

Base Discounts, f.o.b. Pittsburgh

In. O. D.	
1½ and 1¾	44
2 —2¼	13 and 10
2½—2¾	16 and 10
3	17 and 10
3¼—3½	18 and 10
4	20 and 10
4½, 5, 6	21 and 10

Extras for quantity: For 1½ to 1¾, up 8 points under 10,000 lb., up 4 points 10,000 lb. to carload. For 2 in. to 5¾ in., up 2 points without supplementary 10 per cent, under 10,000 lb.; supplementary 5 per cent instead of supplementary 10 per cent for 10,000 lb. to carload.

In sizes 2 in. to 4½ in. O.D. inclusive, all tubes more than four gages heavier than standard are priced per lb. as follows: Carload and over, 9c.; extras for quantity—under 10,000 lb. 1c. per lb., 10,000 lb. to carload ½c. per lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$47.00
4-in., del'd Chicago	50.00
6-in. and larger, del'd New York	45.00
4-in. del'd New York	48.00
6-in., and larger, Birmingham	39.00
4-in. Birmingham	42.00

Class "A" and gas pipe, $3 extra

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts .....70, 10, 10 and 10
Carriage bolts .....70, 10, 10 and 10
Lag bolts .....70, 10, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads .....70, 10, 10 and 10
Hot-pressed nuts, blank or tapped, square .....70, 10, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons .....70, 10, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped .....70, 10, 10 and 10
Semi-finished hexagon nuts U.S.S. all sizes .....70, 10, 10 and 10
Semi-finished hexagon nuts, S.A.E.
¼ in. to 7/16 in. diameter 70, 10, 10 and 10
½ in. to 1 in. diameter 70, 10, 10 and 10
larger than 1 in. diameter 70, 10, 10 and 10
Stove bolts in packages, Pittsburgh.. 75
Stove bolts in packages, Chicago.... 75
Stove bolts in packages, Cleveland.... 75
Stove bolts in bulk, P'gh..... 83
Stove bolts in bulk, Chicago..... 83
Stove bolts in bulk, Cleveland..... 83
Tire bolts .....60 and 10

Large Rivets

(⅛-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland....$2.90
F.o.b. Chicago 3.00
F.o.b. Birmingham 3.05

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh .....70 and 5
F.o.b. Cleveland .....70 and 5
F.o.b. Chicago and Birm'g'm....70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller .....85 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller..... 80
Milled headless set screws, cut thread ¾ in. and smaller .....75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller .....85 and 10
Upset set screws, cut and oval point 75, 10 and 10
Milled studs 75

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped.....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.
Price del'd Detroit is $52.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.45c.
Delivered price at Detroit is.....2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
6100 Chromium Spring Steel....	base
6100 Chromium Vanadium Bar...	1.20
6100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	33c.
Hot-rolled strip	20½c.
Cold-rolled strip	27c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00
Delivered Detroit	
Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open-hearth or Bessemer.....$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved .....1.70c.
Universal .....1.70c.
Sheared .....1.70c.

Tube Rounds

Base per Lb.

F.o.b. Pittsburgh .....1.80c.
F.o.b. Chicago .....1.85c.
F.o.b. Cleveland .....1.85c.
F.o.b. Buffalo .....1.90c.
F.o.b. Birmingham .....1.95c.

Wire Rods

(Common soft, base)

Per Gross Ton

F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	....	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn				
From East Pa. or Buffalo...	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo...	20.89	21.39	20.39	21.89
Philadelphia				
From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati				
From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio				
From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio				
From Hamilton, Ohio.....	20.50	20.50	....	....
Mansfield, Ohio				
From Cleveland and Toledo...	20.26	20.26	....	....
Indianapolis				
From Hamilton, Ohio.....	20.77	20.77	....	....
South Bend, Ind.				
From Chicago	20.55	20.55	....	....
Milwaukee				
From Chicago	19.50	19.50	....	....
St. Paul				
From Duluth	20.94	....	....	....
Davenport, Iowa				
From Chicago	20.26	20.26	....	....
Kansas City				
From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.....$23.50

Johnson City, Tenn.	23.50
Del'd Chicago	29.15
Johnson City, Tenn. (off grade)..	19.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $85.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)..	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$33.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads..	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c
Ferrochromium, 2% carbon	16.50c. to 17.00c
Ferrochromium, 1% carbon	17.50c. to 18.00c
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton.	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.25 to $10.75
No. 2 heavy melting steel	9.50 to 10.00
No. 2 railroad wrought	10.25 to 10.75
Scrap rails	10.25 to 10.75
Rails 3 ft. and under	13.50 to 14.00
Compressed sheet steel	10.25 to 10.75
Hand bundled sheet steel	9.00 to 9.50
Hvy. steel axle turnings	9.00 to 9.50
Machine shop turnings	6.75 to 7.25
Short shov. turnings	6.75 to 7.25
Short mixed borings and turnings	5.25 to 5.75
Cast iron borings	5.25 to 5.75
Cast iron carwheels	11.00 to 11.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.00 to 11.50
Railr. knuckles and couplers	13.50 to 14.00
Rail. coil and leaf springs	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Low phos. billet crops	13.00 to 13.50
Low phos. sheet bar crops	13.00 to 13.50
Low phos. plate scrap	12.50 to 13.00
Low phos. punchings	12.50 to 13.00
Steel car axles	13.00 to 13.50

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Heavy melting steel	$8.50 to $9.00
Automobile hvy. melt. steel	8.00 to 8.50
Shoveling steel	8.50 to 9.00
Hydraulic comp. sheets	7.50 to 8.00
Drop forge flashings	6.50 to 7.00
No. 1 busheling	7.00 to 7.50
Rolled carwheels	10.00 to 10.50
Railroad tires	10.00 to 10.50
Railroad leaf springs	10.00 to 10.50
Axle turnings	8.00 to 8.50
Steel couplers and knuckles	10.00 to 10.50
Coil springs	10.50 to 11.00
Axle turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	10.00 to 10.50
Low phos. plates, 12 in. and under	10.00 to 10.50
Cast iron borings	4.50 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rerolling rails	10.00 to 10.50
Steel rails, less than 3 ft.	10.75 to 11.25
Steel rails, less than 2 ft.	11.50 to 12.00
Angle bars, steel	9.50 to 10.00
Cast iron carwheels	9.50 to 10.00
Railroad malleable	9.00 to 9.50
Agricultural malleable	7.75 to 8.25

Per Net Ton

Iron car axles	$12.00 to $12.50
Steel car axles	10.00 to 10.50
No. 1 railroad wrought	7.00 to 7.50
No. 2 railroad wrought	7.50 to 8.00
No. 2 busheling	3.50 to 4.00
Locomotive tires, smooth	9.00 to 9.50
Pipe and flues	4.50 to 5.00
No. 1 machinery cast	8.00 to 8.50
Clean automobile cast	8.00 to 8.50
No. 1 railroad cast	7.00 to 7.50
No. 1 agricultural cast	7.00 to 7.50
Stove plate	5.25 to 5.75
Grate bars	4.75 to 5.25
Brake shoes	6.00 to 6.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.25 to $9.75
No. 2 heavy melting steel	$8.00 to 8.50
No. 1 railroad wrought	$11.00 to 11.50
Bundled sheets	.... 9.00
Hydraulic compressed, new	9.00 to 9.50
Hydraulic compressed, old	6.50 to 7.00
Machine shop turnings	5.00 to 5.50
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	9.00 to 9.50
Stove plate (steel works)	.... 8.00
No. 1 low phos. heavy	13.00 to 14.00
Couplers and knuckles	12.00 to 12.25
Rolled steel wheels	12.50 to 13.00
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	.... 8.00
Shafting	15.00 to 16.00
Steel axles	15.50 to 16.00
No. 1 forge fire	.... 9.00
Cast iron car wheels	10.00 to 10.50
No. 1 cast	10.50 to 11.00
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	.... 12.00

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$6.75 to $7.25
Scrap rails for melting	8.00 to 8.50
Loose sheet clippings	3.00 to 3.50
Bundled sheets	5.50 to 6.00
Cast iron borings	4.50 to 5.00
Machine shop turnings	4.00 to 4.50
No. 1 busheling	5.50 to 6.00
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.50 to 9.00
No. 1 locomotive tires	8.25 to 8.75
Short rails	11.00 to 11.50
Cast iron carwheels	7.50 to 8.00
No. 1 machinery cast	8.75 to 9.25
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Stove plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	7.75 to 8.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$8.00 to $8.50
No. 2 heavy melting steel	7.50 to 8.00
Compressed sheet steel	7.25 to 7.75
Light bundled sheet stampings	6.50 to 7.00
Drop forge flashings	7.00 to 7.50
Machine shop turnings	6.00 to 6.50
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	7.00 to 7.50
Steel axle turnings	7.00 to 7.50
Low phos. billet crops	12.50 to 13.00
Cast iron borings	6.25 to 6.75
Mixed borings and short turnings	6.25 to 6.75
No. 2 busheling	6.25 to 6.75
No. 1 cast	10.50 to 11.00
Railroad grate bars	7.00 to 7.50
Stove plate	6.50 to 7.00
Rails under 3 ft.	12.50 to 13.00
Rails for rolling	15.50 to 18.00
Railroad malleable	11.50 to 12.00
Cast iron carwheels	9.75 to 10.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting scrap	8.50 to 9.00
Scrap rails	9.50 to 10.00
New hydraul. comp. sheets	8.50 to 9.00
Old hydraul. comp. sheets	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Hvy. steel axle turnings	6.50 to 7.00
Machine shop turnings	5.00 to 5.50
Knuckles and couplers	11.00 to 11.50
Coil and leaf springs	11.00 to 11.50
Rolled steel wheels	11.00 to 11.50
Low phos. billet crops	11.50 to 12.00
Short shov. steel turnings	5.50 to 6.00
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
No. 2 busheling	5.00 to 5.50
Steel car axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	9.00 to 9.50
Stove plate	8.50 to 8.75
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron carwheels	10.00 to 10.50
Industrial malleable	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Chemical borings	7.00 to 7.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.50 to $6.00
Scrap T rails	5.50 to 6.00
No. 2 steel	5.00 to 5.25
Breakable cast	6.00 to 6.50
Machine shop turnings	1.25 to 1.50
Bundled skeleton, long	3.75 to 4.00
Forge flashings	4.25 to 4.50
Blast furnace scrap	2.00 to 2.50
Shafting	11.00 to 11.25
Steel car axles	10.50 to 11.00
Cast iron borings, chemical	6.00 to 7.00
Stove plate	.... 6.50

Per gross ton delivered consumers' yards:

Textile cast	$7.50 to $9.00
No. 1 machinery cast	7.50 to 9.00
Railroad malleable	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$7.00 †$8.00
No. 2 heavy melting steel	*5.50 to †6.50
Heavy breakable cast	6.00 to 6.50
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	6.25 to 6.75
Stove plate	5.50 to 6.00
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rerolling	8.50 to 8.75
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	3.00 to 4.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.25
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	8.00

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	.... $9.00
Scrap steel rails	.... 10.00
Short shoveling turnings	.... 6.50
Stove plates	.... 6.50
Steel axles	$10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	.... 5.50
Rails for rolling	.... 11.00
No. 1 cast	.... 10.50
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	.... 8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.75 to $9.25
No. 1 heavy melting	7.00 to 7.50
No. 2 heavy melting	6.50 to 7.00
No. 1 locomotive tires	9.50 to 10.00
Misc. stand-sec. rails	8.75 to 9.25
Railroad springs	8.50 to 9.00
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	7.50 to 8.00
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	2.50 to 3.00
Rails for rolling	9.25 to 9.75
Machine shop turnings	2.50 to 3.00
Heavy turnings	5.50 to 6.00
Steel car axles	10.50 to 11.00
Iron car axles	12.50 to 13.00
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron carwheels	7.50 to 8.00
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	8.50 to 9.00
No. 1 railroad cast	8.50 to 9.00
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$6.75 to $7.25
Borings and short turnings	4.75 to 5.25
Long turnings	$3.75 to $4.25
No. 1 machinery cast	9.00 to 9.50
Automotive cast	9.75 to 10.25
Hydraul. comp. sheets	6.75 to 7.25
Stove plate	6.25 to 6.75
New factory busheling	5.75 to 6.25
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	3.00 to 3.50
Flashings	5.50 to 6.00
Low phos. plate scrap	7.00 to 7.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic scheelite, delivered†	17.00

Per Gross Ton

Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

Per Net Ton

Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$15.50 to $16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton

Furnace, f.o.b. Connellsville Prompt	$3.85
Foundry, f.o.b. Connellsville Prompt	$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.25c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

Per Net Ton

Standard size	$45.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

Per Net Ton

Standard size, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock—	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 counts,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70c.
Wire, galv. soft, base per 100 lb.	*2.925c.
Common wire nails, per keg	*2.834c.
Cement coated nails, per keg	*2.834c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05c.
Cement c't'd nails, base per keg	3.05c.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled bars, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.50c. to 7.25c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'l'd sheets (No. 24*)	3.85c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21
	Per Cent Off List
Machine bolts, cut thread: All diameters	70
Carriage bolts, cut thread: All diameters	70
	Per 100 Ft.
Boiler tubes: Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.79c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.79c.
Structural rivets	3.99c.
Boiler rivets	4.09c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
1000 lb. or over	60 and 5
200 to 999 lb.	60
100 to 199 lb.	55
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.55c.
†Galvanized sheets (No. 24)	4.25c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under ⅛ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.

†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	.55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.91
Com. wire nails, base per keg (1 to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.16
4-in.	42.32

BUFFALO

	Base per Lb.
Plates	3.37c.
Struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	$3.25
Black wire, base per 100 lb.	3.55c.

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.*
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.52c.*
Floor plates, diamond pattern	5.33c.
Bar and bar shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c.
Half rounds, half ovals, ovals and bevels	4.55c.
Tire steel	4.55c.
Cold-finished rounds and hexagons	5.25c.*
Cold-rolled strip steel	3.245c.
Cold-finished squares and flats	5.75c.
Blue annealed sheets, No. 10 gal.	3.60c.
One pass cold-rolled sheets No. 24 ga.	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

*Base.

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.60c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.45c.	4.40c.
Hot - rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel: Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg less carload	$3.40	$3.25	$3.30

All items subject to differentials for quantity.

TRADE NOTES

Allsteel Press Co., 12015 South Peoria Street, Chicago, maker of punch presses and press brakes, has appointed Mechanical Equipment Sales Co., 416 Chamber of Commerce Building, Cincinnati, exclusive representative in Cincinnati district.

Combustion Engineering Co., Inc., New York, has divided its southern territory into two districts. The southeastern will extend from Richmond, Va., to Florida, with headquarters at Charlotte, N. C., in charge of T. C. Heyward as district manager. The southwestern district will extend south of the Kentucky-Tennessee border and west of Atlanta to the Mississippi River, with headquarters at Chattanooga, Tenn., under L. C. Haller as district manager.

Stolle Corpn., Cincinnati, has opened a branch plant at Sidney, Ohio, for electroplating, rust-proofing and hard chromium plating.

Caterpillar Tractor Co., reports $2,932,892 net profit for the nine months ended Sept. 20, compared with $304,365 net loss in the corresponding period of last year. September sales totaled $1,742,525 and net profit for the month was $266,548.

George D. Miller Co. has been appointed exclusive representative, in Cleveland territory, which includes all nothern Ohio, for the Lees-Bradner Co., manufacturers of gear hobbing machines, gear generators, thread milling machines and gear testing machines.

Thomas Prosser & Son, 15 Gold Street, New York, manufacturers and United States distributors of Widia cemented carbide tools, have appointed J. J. Connell, 4717 Malden Avenue, Chicago, to cover the States of Illinois and Iowa; W. D. Briggs, P. O. Box 315, Portland, Ind., for Indiana, and G. M. Mencke, 704 Race Street, Cincinnati, in southern Ohio and Kentucky. Products handled will include Widia cemented carbide tools, forged and hardened steel rolls, rolling mills and various mechanical specialties manufactured by Fried. Krupp A.G., Essen-Ruhr, Germany.

Abrasive Wheels.—Bakelite Corpn., Bound Brook, N. J. Booklet gives construction data and various operating installations of abrasive wheels bonded with Bakelite Resinoid. The grinding wheels so bonded can operate at higher speeds and are stronger, thereby having certain industrial advantages.

Conveyers.—Mathews Conveyer Co., Elwood City, Pa. A complete catalog covering the design, assembly, and applications of conveyer equipment. Detailed specifications, cuts, and engineering tables provide important data for incorporation into plans for materials handling lay-outs. Seventy-two pages, loose leaf and compiled in an organized manner.

Lead Market Active as Quotations are Advanced $2 a Ton—Zinc Also Higher

Copper Quiet in Spite of Stronger Prices Abroad—Tin Buying Light With Reports of Plans to Advance Production Quotas

NEW YORK, Oct. 23.—Copper buying continues light with daily sales averaging scarcely 500 tons. The Blue Eagle price is unchanged at 9c. a lb., delivered Connecticut Valley, but European prices have risen rather sharply in the last week. Today's quotation is around 6.75c. a lb., c.i.f. usual Continental base ports, as compared with 6.40c. one week ago, and sales have been reported at an even higher level. Price strength abroad is generally attributed to reports of contemplated production control which now seems to be closer to realization than has been the case for some time. Copper consumption in the United States is apparently being maintained and users are drawing heavily on their stocks.

Tin

The market in both New York and London has been extremely quiet in the last week while price fluctuations here were confined largely to the changes in Sterling exchange. Straits metal was quoted in New York this morning at 51.25c. a lb., only 30 points above the level of a week ago, and has fluctuated entirely within that range. In the London market spot metal was quoted today at £230 12s. 6d. and future at £228 15s. with the Singapore price £230 5s. Reports that production quotas were to be advanced sharply in the first quarter could not be confirmed at reliable sources and have had little or no effect on the market. It is pointed out that such large increases as have been mentioned are entirely out of reason.

Lead

This market is the most active in the non-ferrous group and advancing prices, together with increasing consumption, developed heavier purchases in the last week than have been reported for two or three months. The October position is now believed to have been wholly covered, but a considerable amount of November metal remains to be bought. Shipments this month are running well ahead of September and consumption is believed to be steadily increasing, with paint manufacturers the principal outlet. Quotations were advanced five points on Wednesday and a similar amount on the day following, while one large seller has maintained its $1 a ton differential over its competitors. Under the circumstances, today's market is quotable at a range of 3.55c. to 3.60c., St. Louis, and 3.70c. to 3.75c. a lb., New York. The London market is also stronger; prices having been advanced $1 a ton there this morning. Joplin ore was also marked up $2 a ton on Saturday to $34 for small lots and $36 for large quantities.

Zinc

In the face of rather quiet demand, spelter prices were advanced five points over the week-end and zinc is now quotable at 3.85c. a lb., East St. Louis, and 4.20c. a lb., New York. The increase followed reports of a stronger market on concentrates, the flotation grade having moved up $1 a ton on Saturday to $25 a ton. Prime ore is unchanged at $26. Sales of Prime Western last week amounted to about 3500 tons, compared with 3300 tons in the previous period and 5000 tons two weeks ago. Several fairly large purchases were reported, but demand is not well diversified and many consumers took advantage of the price shading earlier in the month to cover their requirements for this month and next. Production of smelters last week remained low at 1400 tons in the face of sales of 4000 tons and shipments of 4900 tons. Output this week is expected to be resumed on a normal basis.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 17	Oct. 18	Oct. 19	Oct. 20	Oct. 22	Oct. 23
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	51.00	50.95	51.10	....	51.10	51.25
Zinc, East St. Louis	3.80	3.80	3.80	3.80	3.85	3.85
Zinc, New York	4.15	4.15	4.15	4.15	4.20	4.20
Lead, St. Louis	3.50	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.65	3.70	3.70	3.70	3.70	3.70

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb., delivered; new No. 12, 19.50c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 9.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.50c. to 53.50c.
Tin, bar	54.50c. to 55.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.50c.
*Seamless brass tubes	17.00c.
*Seamless copper tubes	17.25c.
*Brass rods	13.00c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.50c.
Antimony, Asiatic	11.00c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.00c. to 33.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	55.50c.
Tin, bar	57.50c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	4.75c. to 5.00c.
Lead, bar	7.75c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	59.50c.
Solder, ½ and ½	33.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.12½c.	5.75c.
Copper, light and bottoms	4.25c.	4.75c.
Brass, heavy	2.75c.	3.25c.
Brass, light	2.25c.	3.00c.
Hvy. machine composition	4.00c.	4.75c.
No. 1 yel. brass turnings	4.25c.	4.75c.
No. 1 red brass or compos. turnings	4.00c.	4.50c.
Lead, heavy	2.75c.	3.12½c.
Zinc	2.00c.	2.37½c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Jones & Laughlin's Second Quarter Loss

THE Jones & Laughlin Steel Corpn., Pittsburgh, and subsidiary companies report for the third quarter of this year net loss, after operating expenses, depreciation and interest on bonds, of $1,826,227. In the third quarter last year the company sustained a loss of $1,143,917, and in the first nine months of the current year a total loss of $2,864,499.

The Lewis Foundry & Machine Co., Pittsburgh, has received an order to build a three-high mill complete with run-out tables and accessories for the Steel Co. of Canada, Ltd. The Lewis Company also has contract for complete non-ferrous rolling mill for Ball Brothers Co., Muncie, Ind., for rolling zinc sheets.

Reinforcing Steel

Awards 2600 Tons—New Projects 1200 Tons

Norfolk, Mass., 400 tons, prison industrial buildings, to Morrison-Stevens Co.

Providence, R. I., 300 tons, mesh for airport, to American Steel & Wire Co.

New York, 680 tons, market and store building in Bronx, to Joseph T. Ryerson & Son, Inc.

Dutchess County, N. Y., 400 tons, mesh for highway, to Kalman Steel Corpn.

Chemung County, N. Y., 250 tons, mesh for highway, to Kalman Steel Corpn.

Chester, Pa., 100 tons, addition to Scott Paper Co. building, to Taylor, Davis, Inc.

State of Colorado, 100 tons, highway work in five counties, to unnamed bidders.

Los Angeles, 200 tons, debris dam on Verduga Wash, to Truscon Steel Co.

San Francisco, 170 tons, Recorder Printing Co. building, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Boston, 440 tons, parcel post building.

Des Moines, Iowa, 350 tons, post office.

Chicago, 100 tons, public school building.

St. Louis, 600 tons, Hampton Avenue viaduct; McCormack-Combs Construction Co., St. Louis, low bidder on general contract.

Camden County, Mo., 250 tons, substructure for bridge over Lake of the Ozarks; W. A. Clark Construction Co., Kansas City, general contractor.

San Jose, Cal., 395 tons, city auditorium; Soule Steel Co., low bidder.

Ontario, Cal., 100 tons, mausoleum; general contract awarded.

Trade Publications

High-Speed, Super High-Speed and Stainless Steels.—Firth-Sterling Steel Co., McKeesport, Pa. Three illustrated folders giving data on the heat treatment, forming and physical characteristics of these products. The information given is quite complete and should be of value to users.

Enameling Iron.—American Rolling Mill Co., Middletown, Ohio. Two illustrated pamphlets listing general information about enameling iron for the enameler, fabricator and purchasing agent. Also includes a mass of data of use to job enamelers and their retail outlets.

Fast Cutting Screw Stock.—Bliss & Laughlin, Inc. An attractive folder showing micrographs and physical data for Ultra-Cut screw stock. Uniformity of structure, smooth finishing, fast cutting possibilities and ease of hardening are featured.

Puddling Process, a History—Reading Iron Co., Philadelphia. An elaborate and interesting resumé of the puddling process which sketches production methods from antiquity to the present time.

Heat-Treating Steels With Cyanides and Salts.—E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. A very complete manual covering the procedure to be followed for case hardening, reheating, nitriding and mottling steels with sodium cyanide. Also describes the procedure for coloring, tempering and drawing steels with heat-treating salts.

Rust Removal.—Oakley Paint Mfg. Co., 727 Antonia Street, Los Angeles, Cal. A folder describing a liquid which is painted on a rusted surface after which it and the dissolved rust are washed off with a hose.

Foundry Fluxes.—Foundry Services, Inc., 107 East 41st Street, New York City. A folder giving the advantages of Foseco fluxes for all tyes of ferrous and non-ferrous melts. Fluxes are said to prevent oxidation and gas absorption; cleans the metal of dirt and removes sulphur, oxygen and carbon from nickel melts.

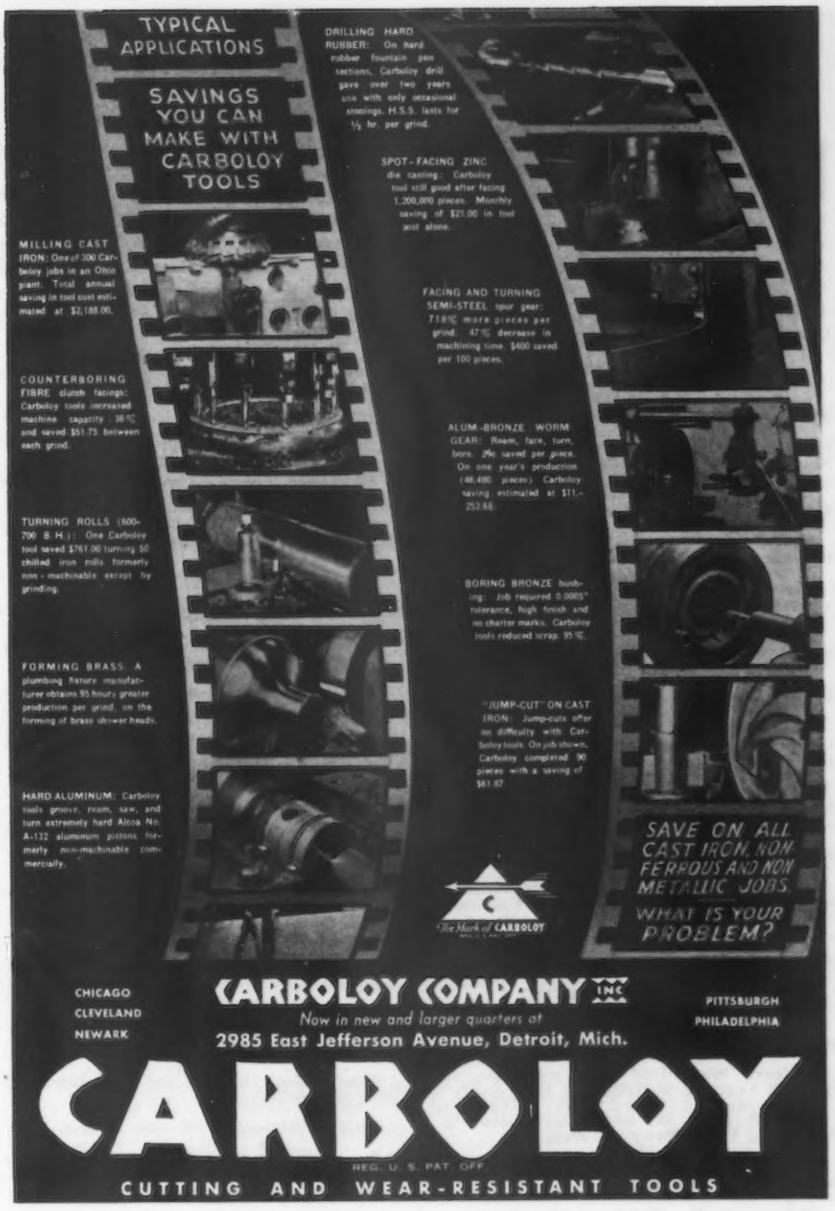
Chapmanizing for Hardening Low-Carbon Steel.—Chapman Valve Mfg. Co., Indian Orchard, Mass. Attractive booklet describing a new method of surface hardening. Process involves the addition of nitrogen to iron base alloys by heating the metals in the presence of a nitrogenous material. Chapmanized metal will scratch glass, but the case is said to be so ductile that it will not chip or flake under hard service.

Structure and Properties of S.A.E. 1040 Steel.—Carnegie Steel Co., Pittsburgh. Booklet describing the different characteristics and properties of grain size of S.A.E. 1040 forging steels. Shows effects of McQuaid-Ehn grain size on the structure and fabricating properties of the steels.

Silicon Bronze Alloy.—Cramp Brass & Iron Foundries Co., Philadelphia. Illustrated folder giving characteristics of P.M.G. alloy designed to take the place of bronzes containing tin. Alloy is obtainable in cold-drawn shapes and forging stock which have a high corrosion resistance. Can be handled in the foundry. Fine grain structure makes it adaptable to hydraulic fixtures.

Monel Metal, Nickel and Nickel-Clad Steels.—International Nickel Co., Inc., 67 Wall Street, New York. Booklet gives data on the physical and mechanical properties of these materials and contains considerable information, including instructions on the selection of suitable welding rod and other details of fabrication.

Light Metals and Their Alloys.—American Society for Testing Materials, Philadelphia. A large report presenting concisely the essential technical data and information for aluminum, magnesium and their more important alloys. The four parts include metallurgical characteristics, industrial requirements, surface protection and tabular data.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BORING BRONZE bushing: Job required 0.0005" tolerance, high finish and no chatter marks. Carboloy tools reduced scrap 35%.
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"JUMP-CUT" ON CAST IRON: Jump-cuts offer no difficulty with Carboloy tools. On job shown, Carboloy completed 90 pieces with a saving of $61.87.
HARD ALUMINUM: Carboloy tools groove, ream, saw, and turn extremely hard Alcoa No. A-132 aluminum pistons formerly non-machinable commercially.
SAVE ON ALL CAST IRON, NON-FERROUS AND NON-METALLIC JOBS. WHAT IS YOUR PROBLEM?
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CUTTING AND WEAR-RESISTANT TOOLS

Fabricated Structural Steel

Awards in Good Volume—New Projects Slightly Higher

LETTINGS of 22,100 tons, the largest since the last week in August, were swelled by 8000 tons for a parcel post building in Boston and 2500 tons for a bridge over the Lake of the Ozarks in Camden County, Mo. New projects of 14,500 tons compare with 14,302 tons last week and 6400 tons two weeks ago. The largest inquiries are 4000 tons for a tuberculosis hospital in Jersey City, N. J., 1300 tons for a highway bridge at Leechburg, Pa., and 1000 tons each for a police headquarters in Buffalo and a school in Long Beach, Cal. Plate lettings are low at slightly over 500 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Boston, 8000 tons, parcel post building, to American Bridge Co.

Boston, 280 tons, I. J. Fox Co. building, to New England Structural Co.

Hamden, Conn., 730 tons, high school, to Bethlehem Fabricators, Inc.

New York, 860 tons, Fordham University building, to Bethlehem Fabricators Inc.

Eastview, N. Y., 465 tons, grade crossing elimination, to American Bridge Co.

Hewlett, N. Y., 370 tons, transmission towers, to Lehigh Structural Steel Co.

Buffalo, 1275 tons, Kensington high school, to Buffalo Structural Steel Corpn.

Erie County, N. Y., 135 tons, highway bridge, to R. S. McMannus Steel Construction Co.

Arcade, N. Y., 190 tons, State highway bridge, to Ernst Iron Works.

Utica, N. Y., 160 tons, brewery, to Ernst Iron Works.

Gowanda, N. Y., 130 tons, State highway bridge, to R. S. McMannus Steel Construction Co.

Washington, 150 tons, blimp hangar, to Austin Co.

SOUTH AND SOUTHWEST

Montgomery, Ala., 225 tons, bridge, to Virginia Bridge & Iron Co.

Gulfport, Miss., 1100 tons, warehouse, to Jones & Laughlin Steel Corpn.

Maxwell, Tenn., 300 tons, Wheeler dam, to Mississippi Valley Structural Steel Co.

State of Georgia, 150 tons, highway bridge, to Taylor Iron Works.

Springer, N. M., 410 tons, bridge, to American Bridge Co.

Las Vegas, N. M., 335 tons, bridge beams, to American Bridge Co.

State of New Mexico, 140 tons, outlet tunnel steel for Middle Rio Grande Conservancy district, to American Bridge Co.

Watrous, N. M., 360 tons, State highway bridge, to American Bridge Co.

Missouri Pacific Railroad, 125 tons, bridge at Fort Worth, Tex., to Virginia Bridge & Iron Co.

CENTRAL STATES

Cleveland, 112 tons, building for Meyer Dairy Products Co., to Republic Structural Iron Works.

Chicago, 175 tons, bridge substructure, to Hansell-Elcock Foundry Co.

Kansas City, Mo., 1400 tons, bridge, to Kansas City Structural Steel Co.

Camden County, Mo., 2500 tons, superstructure of bridge over Lake of the Ozarks, to Stupp Brothers Bridge & Iron Co.

Roscoe, Neb., 300 tons, bridge, to McClintic-Marshall Corpn.

WESTERN STATES

Dotsero, Colo., 280 tons, overhead crossing, to Midwest Steel & Iron Co.

Sanders County, Mont., 224 tons, bridge over Thompson River, to Virginia Bridge & Iron Co.

San Jose, Cal., 500 tons, city auditorium, to Pacific Coast Steel Corpn.

Pullman, Wash., 175 tons, power house at Washington State College, to Poole & McGonigle.

Clackamas County, Ore., 100 tons, State bridge over Deep Creek, to an unnamed bidder.

Pearl Harbor, T. H., 400 tons, two substations at Naval Base, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

New York, 600 tons, apartment house for Jasko Realty Corpn., New York.

Buffalo, 1000 tons, police headquarters; bids Nov. 9.

Jersey City, N. J., 4000 tons, tuberculosis hospital; bids Nov. 8.

Leechburg, Pa., 1300 tons, highway bridge; bids Nov. 2.

Washington, 250 tons, garage and car barn for Capitol Transit Co.

SOUTH AND SOUTHWEST

Millard, Ky., 200 tons, bridge.

Suffolk, Va., 140 tons, State highway bridge.

Ottawa County, Okla., 670 tons, State highway bridge.

State of Oklahoma, 1300 tons, three bridges.

CENTRAL STATES

Toledo, Ohio, 250 tons, factory building for du Pont company.

State of Minnesota, 240 tons, bridges.

St. Louis, 200 tons, Hampton Avenue viaduct; McCormack-Combs Construction Co., St. Louis, low bidder on general contract.

State of Missouri, 310 tons, highway bridges: Bates County, 210 tons; Holt County, 100 tons; bids Nov. 2.

WESTERN STATES

Valley County, Mont., 135 tons, State bridge across Milk River; bids Oct. 25.

Los Angeles, 120 tons, two cranes for city, specification 1530; bids Nov. 2.

Seattle, 215 tons angle steel for city, three identical bids submitted.

Long Beach, Cal., 1000 tons, school.

San Pedro, Cal., 500 tons, post office.

Hueneme, Cal., 400 tons, pier shed.

Burbank, Cal., 400 tons, building.

Fresno, Cal., 350 tons, auditorium.

Santa Barbara, Cal., 350 tons, auditorium.

Santa Ana, Cal., 300 tons, school.

Los Angeles, 225 tons, school.

Pearl Harbor, T. H., 250 tons, hangar at Naval Air Base, specification 7770; bids Nov. 14.

FABRICATED PLATE

AWARDS

Plandome, N. Y., 110 tons, 10 tanks, to Graver Tank & Mfg. Co.

Sayreville, N. J., 230 tons, tanks for Titanium Pigment Co., to Treadwell Construction Co.

St. Louis, 180 tons, 10 pontoons for United States Engineer's Office, to Ingalls Iron Works.

NEW PROJECTS

Shawano, Wis., closed bids Oct. 22 on one 250,000-gal. steel water tank on 130-ft. tower.

Washington, 159 tons, material for Navy Yards, specification 3486; bids Oct. 26.

Upland, Cal., 112 tons steel pipe, city water system; bids under advisement.

New England Industry In Slow Upturn

BOSTON, Oct. 23.—Pig iron sales here and elsewhere in New England remain small, with little prospect of immediate betterment. Recent sales included Buffalo, Eastern Pennsylvania, Alabama and Indian irons in carlots, with the aggregate limited to a few hundred tons. Melt is spotty, with a large majority of foundries doing little or nothing, but with slight improvement apparent in the Connecticut area. Jobbing foundry stocks generally are not large, and any improvement in business probably would be reflected in pig iron buying.

Interest in scrap centers largely in the export market, buying for Pennsylvania delivery being nil. A steamer is scheduled to begin loading about 2000 tons of No. 1 and No. 2 scrap here this week, and will then go to Providence, R. I., to take on 2500 tons, including some carwheels and cast iron for Poland delivery. Negotiations are under way for additional exports, but have not reached a stage where definite information is forthcoming. The Textile Machinery & Supply Co. of Fall River, Mass., has purchased the Manville-Jenckes Co. Globe Mill at Woonsocket, R. I., including 39,024 spindles and 294 looms, not operated since 1930. Part of the equipment will be scrapped.

Sentiment here is more hopeful. The stabilization of steel prices will, it is believed, release considerable private construction and industrial work, and ultimately mean larger scrap sales. Electrical goods makers report some pick-up in orders; air-conditioning equipment orders are looking up; ship repairing is slightly better; and many individual industries report some business upturn. The Electric Boat Corpn. has ordered hull material for three submarines recently contracted for by the Government and deliveries are expected within a month or so.

During the 12 months ended July, 1934, world tin plate output was estimated at 3,218,000 tons, against 2,565,000 tons the previous 12 months and 2,389,000 tons in the 12 months ended July, 1932. The comparative figures for world automobile output are: 3,604,000 units, 2,328,000 units, and 2,183,000 units.

Railroad Equipment

Milwaukee Road is having American Locomotive Co. build two streamlined steam locomotives for high-speed service.

Atchison, Topeka & Santa Fe is considering ordering one 3600-hp. Diesel electric locomotive from General Motors Corpn. This railroad has ordered air-conditioning equipment for 80 cars from Safety Car Heating & Lighting Co.

Anglo Mexican Petroleum Corpn. has ordered 75 tank cars from the General American Transportation Corpn.

Delaware River Bridge Joint Commission, Camden, N. J., is inquiring for 44 subway cars.

St. Louis-San Francisco will expend $93,672 to air condition two dining cars and 26 coaches.

St. Louis Car Co. is working on an order for 15 passenger coaches and 11 mail and express cars for Chesapeake & Ohio Railroad and one mail and express car for New York, Chicago & St. Louis.

Corn Products Refining Co. has ordered 75 tank cars from General American Transportation Co.

Akron, Canton & Youngstown Railroad has made an application to the PWA for a loan of $500,000 to finance the purchase of rails and fastenings.

RAILS

Bureau of Reclamation has taken bids at Kansas City, Mo., for 490 tons of rails, on which Bethlehem Steel Co. is low bidder.

Pipe Lines

Emporia, Kan., plans about 90 miles of steel pipe for municipal gas distribution. Bonds for $345,000 will be voted at general election, Nov. 6, for portion of work, with other financing later. Total cost about $1,000,000. Black & Veatch, Mutual Building, are consulting engineers. Arthur Ericsson is utilities commissioner.

Sedgwick, Kan., plans steel pipe line for municipal gas distribution. Financing is being arranged. Hefling & Hughes Engineering Co., 20 West Second Avenue, Hutchinson, Kan., is consulting engineer.

Oklahoma Natural Gas Co., Oklahoma City, Okla., has authorized about 4400 ft. of steel pipe on East Reno Avenue for gas service, including new distributing station on High Street.

Rankin, Tex., closes bids Oct. 25 for 31,700 ft. of 2 and 3-in. welded steel pipe for natural gas distribution. J. S. Pittman is city engineer.

Newport, Wash., plans about 4000 ft. of 10-in. steel pipe for main water trunk line; also quantity of cast iron pipe for distribution mains. J. C. Stegner is city engineer.

Lone Star Gas Co., Dallas, Tex., has let contract to A. F. Day Construction Co., 132 North Lancaster Street, city, for 12-in. welded steel pipe line from natural gas fields at Long Lake, Anderson County, to Riesel, McLennan County, where connection will be made with main trunk line, about 75 miles. Cost about $900,000. This is part of an expansion program of company. Entire project will cost $2,000,000, including new distribution mains in number of towns in central Texas. J. L. Foster is chief engineer; E. F. Schmidt, general superintendent.

Cast Iron Pipe

Weymouth, Mass., closed bids Oct. 22 on four carloads of flanged material.

Somerville, Mass., closed bids Oct. 22 on 6126 ft. of 12-in., 800 ft. of 10-in. and four lengths of 6-in.

Beverly-Salem, Mass., closes bids Oct. 25 on about 150 tons of 24 and 30-in.

Youngstown, Ohio, has placed 175 tons with James B. Clow & Sons.

Benld, Ill., has opened bids on 1000 tons.

Madison, Wis., has awarded 150 tons to James B. Clow & Sons.

Highland Park, Mich., has placed 110 tons with James B. Clow & Sons.

St. Elmo, Ill., will take bids Nov. 1 for 9895 lin. ft. of 6 and 8-in. for waterworks improvement, including distribution system, dam and reservoir and filter plant, to be financed by $65,210 PWA loan.

Milwaukee Township, Wis., has rejected bids opened Oct. 16 on 2221 lin. ft. of 8-in. and 1255 lin. ft. of 16-in., and will close new bids Nov. 1. Edward Prahlow is town clerk.

Murfreesboro, N. C., asks bids until Nov. 2 for 17,000 ft. of 6 and 8-in. for water supply; also for 75,000-gal. elevated steel tank and tower. Spoon & Lewis, Greensboro, N. C., are consulting engineers.

Fountain Green, Utah, plans about 33,750 ft. of various sizes for water supply, replacing present wood pipe. Fund of $40,000 has been secured through Federal aid.

Broken Bow, Neb., plans about 12,000 ft. of 4, 6 and 8-in. for water supply. Fund of $34,000 has been arranged for this and other waterworks improvements. F. A. Raasch is superintendent of water department.

Conneaut, Ohio, plans 12-in. in Lake Road for trunk line water supply. Financing is being arranged.

Glasgow, W. Va., closed bids Oct. 25 for 7200 ft. of 4 and 6-in. for water supply. J. E. Settle, Charleston National Bank Building, Charleston, W. Va., is consulting engineer.

Mountain Home, Idaho, plans 6560 ft. 8-in., 17,300 ft. 6-in. and 13,300 ft. 4-in. for water supply, replacing present mains. Fund of $43,000 is being secured through Federal aid for this and other water system improvements. James Spafford, Mountain Home, is engineer.

Gnadenhuten, Ohio, plans water pipe line system. Fund of $49,000 has been secured through Federal aid for this and other waterworks equipment. Arnold, Rosch & Hartlein, New Philadelphia, Ohio, are consulting engineers.

Central, S. C., asks bids until Oct. 30 for 8960 ft. of 3, 6 and 8-in. cast iron pipe, and 28,200 ft. of 1, 1½ and 2-in. galvanized pipe for water supply. Harwood Beebe Co., Spartanburg, S. C., is consulting engineer.

Pinedale, Wyo., plans water pipe line system. Fund of $25,000 is being arranged.

Morrisonville, Ill., closes bids Nov. 30 for water pipe line system and other waterworks construction. Fund of $31,000 is available. Warren & Van Praag, Milliken Building, Decatur, Ill., are consulting engineers.

Aransas Pass, Tex., plans about 17,000 ft. of 6 and 8-in. Bonds for $28,000 have been authorized for this and other water system extensions. L. B. Griffith, Sherman Building, Corpus Christi, Tex., is consulting engineer.

Phoenix, Ariz., has awarded 1040 tons to American Cast Iron Pipe.

Oakland, Cal., has let 650 tons to National Cast Iron Pipe Co.

To get 'em hot— keep 'em hot— and stirred up— Duriron Steam Jets are the "berries".

Duriron Steam Jets in pickling tanks at Thomas Steel Co., Warren, Ohio.

Pickling efficiency requires (1) that the tanks be brought up to temperature in as short a time as possible, (2) that the temperature remain practically constant, and (3) that the liquor be in complete circulation.

That's where Duriron Circulating Steam Jets make the Superintendent's life a little less of a merry-go-round.

When production starts coming through, the tanks are ready to take it. The temperature is regulated by the turn of a valve, and the tank isn't being hammered to pieces in the meanwhile.

It does seem foolish to use hand-me-down methods when tailored-to-your-order methods are so much better—and cheaper in the long run.

Duriron Jets are "tailored" to your tanks, and corrosion-proof. Write for Bulletin No. 165—it might suggest an idea.

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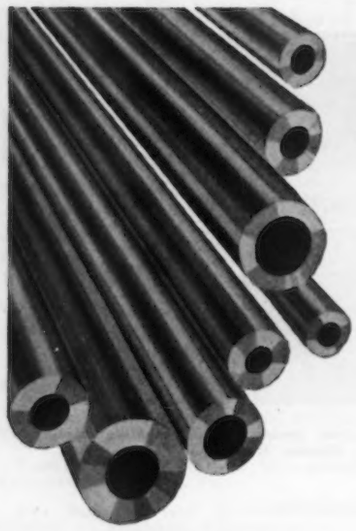

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Cincinnati Philadelphia

German Steel Output Continues To Rise—Exports Are Also Heavier

HAMBURG, Oct. 15 (*By Special Correspondence*).—The German steel industry continues to prosper and dividend payments are being resumed. The Klockner works were the first to restart payment with 2½ per cent on the business year ended June 30, after having advanced depreciation charges 50 per cent.

Steel production is still rising, having amounted to 1,022,000 tons in June, 1,038,500 tons in July, 1,063,000 tons in August, with a probable further rise in September. More plants are being compelled to return to the three shifts. Though the bulk of orders are coming from domestic sources, export business is also absorbing greater quantities than last year. Output was only 634,000 tons in August, 1933, and 407,600 tons in August, 1932.

Almost all steel works are investing in plant modernization and replacement of obsolete machinery. Many are building plants for hydrogenization and distillation of coal and better utilization of gas.

Exports Increasing

German exports of iron and steel products are also increasing satisfactorily. Total exports of semi-finished and finished steel, not including tubes, sheets, wire and hardware products, totaled 154,000 tons in August, compared with 142,000 tons in July and with 108,900 tons in August, 1932. A further rise is anticipated. Average export values have also advanced, and higher quality products are moving more rapidly than merchant steel.

Barter Trading Increasing

The German steel tube cartel has started barter trading through an import office which is cooperating with a number of Hamburg raw material importers. The difficulty of barter trading is to arrange the different conditions of payment and delivery with a number of different companies. The tube cartel, however, has organized the trade in such a way that it ships the pipe and takes the raw materials itself.

In the last few weeks more than 20,000 tons of oil well and other tubing has been sold for export by this system. Ten per cent of the invoice sum can be paid by blocked mark accounts, mainly in hands of the large oil companies abroad. Recent orders include tonnages from Burma, Peru, Venezuela, Argentina, Netherlands, East Indies and Borneo. Payment is made in oil, minerals, hides, cotton, wool, etc., which the tube cartel takes at a fixed price to the extent of 90 per cent of the value of the tube orders.

Another large barter contract has been arranged between the Krupp organization, which acts for a number of other companies, and the Turkish Government covering railroad materials, steel, machinery, electrical equipments, in exchange for ores, wool, hides, fruits, etc., amounting to approximately $9,000,000. Among the orders is a special train for the Ghazi Kemal Pascha consisting of seven special cars.

The Ueberwachungstelle für Eisen & Stahl, the newly formed office for control of iron and steel, is limiting imports of scrap and ores. Beginning with 1935, no fresh contracts can be placed for scrap and ores without importers proving that the full value of the imports is offset by exports of German products, mainly steel. The import trade of Wabana and Morocco ores will come to an end, as Newfoundland has refused to take German goods in exchange. The orders will go to Sweden, with which Germany has a very favorable balance of trade.

Sheet Steel Sales Higher Last Month

SALES of sheet steel expanded moderately in September, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. Production and shipments, as reported by the association, declined slightly from the August figures. In this survey, which is based on figures covering a monthly capacity of 325,000 tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, makers reported sales of 77,063 tons in September, compared with 66,064 tons in August; production of 76,051 tons against 77,197 tons, and shipments of 73,260 tons, contrasted with 77,706 tons. Unfilled tonnage on Oct. 1 totaled 67,062 tons, or 20.6 per cent of capacity, compared with 64,270 tons, or 19.8 per cent of capacity on Sept. 1. The September report with comparisons of the two preceding months, in net tons, follows:

	September	August	July
Sales	77,063	66,064	72,517
Production	76,051	77,197	85,286
Shipments	73,260	77,706	85,442
Unfilled orders	67,062	64,270	69,472
Unshipped orders	35,490	37,314	39,038
Unsold stocks	64,398	71,968	71,362
Capacity per month	550,000	550,000	550,000
Percentage reporting	59.0	59.0	59.0
Percentages, Based on Capacity			
Sales	23.7	20.3	22.3
Production	23.4	23.8	26.2
Shipments	22.6	23.9	26.3
Unfilled orders	20.6	19.8	21.4
Unshipped orders	10.9	11.5	12.0
Unsold stocks	19.8	22.1	22.0

The PWA has made an allotment of $1,204,940 for air conditioning all offices in the Interior Department building which is to be occupied by other Government bureaus when the new $10,000,000 edifice is completed. Construction is to begin at an early date.

British Machine Tool Industry in Second Quarter*

THE machine tool industry of the Birmingham consular district has shown much improvement in all directions during recent months. While this follows largely upon a resurgence of activity in the principal engineering trades, one of the principal contributory causes is stated to be the almost complete absorption of the second-hand machine tool market. For some considerable time the economic and industrial depression in the majority of machine tool-using trades has stimulated the demand for rebuilt machinery of all classes, and this has tended seriously to depress the market for new machine tools. The continued purchasing of the second-hand product has so depleted available stocks of the more commonly used types in this category that users are now being forced to purchase the new product for the majority of their requirements. Coinciding with a general increase in industrial activity this factor has, during the past few months, greatly stimulated machine tool production throughout this district.

Extent of Local Activity

At the present time practically all of the machine tool firms in the Birmingham district are busy. In many instances overtime, and even night work, is rendered necessary in order to cope with existing orders, and considerable factory extensions are recorded. One of the most prominent local machine tool firms reports as much as 15 per cent increase in production during the past month.

The present demand is stated to be chiefly in respect of all classes of screw-manufacturing machines and thread-forming tools. This is largely accounted for by increased activity in the automobile, radio, shipbuilding, constructional engineering and hardware trades. Due to increased production in the local brass and allied metal working trades, the machine tool stocks of one important Birmingham firm are stated to have been completely exhausted during the past few months and, at the present time, the firm is extensively engaged in building metal spinning lathes, capstan lathes, sawing machines, rotary cutting-off machines and other brass shop equipment, including small tools and chuck collets.

There is also an increasing demand for milling cutters, boring and facing heads, reamers, serrated cutter blades and similar metal-working equipment. Small tool and tool equipment firms are, at the moment, stated to experience difficulty in coping with the quantity of work offered, and orders for jigs and fittings are greater than productive capacity. One local firm has recently acquired new premises covering 15,000 sq. ft., which are being laid out and equipped for rebuilding all types of machine tools. These premises also house an extensive range of transmission equipment, including 400 tons of shafting from 1 in. to 10 in. in diameter.

The entire bearing equipment now being made in Birmingham for a foreign steel rolling mill consists of 68 tapered roller bearings, and includes four roller bearings which are stated to be the largest in the world.

Exports and Imports of Machine Tools

British machine tool exports for the first five months of the past three years are shown in the following official Board of Trade statistics, and include the countries of destination and the classes of products concerned:

During the past twelve months the level of exports of British-made machine tools reached its highest point in June, 1933. Although during the immediately ensuing months these exports depreciated, they have recently shown some revival and, during the current month, appear likely to exceed the volume indicated a year ago.

Imports of machine tools into Great Britain for the first five months of the past three years are given as follows:

	Five Months Ended 31st May		
	1932	1933	1934
	£	£	£
Machine tools (metal working), etc.	450,123	315,660	530,079

For the past year, imports of machine tools into Great Britain have remained consistently steady, little variation in total volume being re-

*A report from American Consul General at Birmingham, England, to the Bureau of Foreign and Domestic Commerce.

BRITISH MACHINE TOOL EXPORTS

	Five Months Ended 31st May		
	1932	1933	1934
Machine Tools (metal working)	£	£	£
To British India	64,055	61,683	56,240
To Other British countries	53,951	59,916	115,387
To Soviet Union (Russia)	1,307,053	396,348	126,200
To France	38,070	21,673	30,920
To Other Foreign Countries	90,281	134,488	185,574
Total	1,553,410	674,108	514,321
Of Which			
Drilling	191,841	61,898	54,319
Grinding	168,294	183,455	92,998
Lathes	469,000	193,971	147,263
Milling	118,889	43,953	43,468
Planing and Shaping	301,513	18,372	24,319

HY-TEN S.A.E. STEELS

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WHEELOCK, LOVEJOY & COMPANY, INC.

CAMBRIDGE CHICAGO CLEVELAND DETROIT

corded during the period in question. However, the figures for the month of May, 1934, show a marked increase both in total quantity and value comparison for the past two months being as follows:

	Quantities (Tons) 1934		Value (£) 1934	
	April	May	April	May
Machine Tools (metal working), etc. ...	341	812	77,967	146,946

This increase is said to be due, in the main, to seasonal industrial reorganization, particularly in the local automobile industry, which is now extensively engaged upon production plans for next-year models, though it is so marked as to reflect an appreciably better position in the machine-using trades than was the case at this period last year.

As of possible interest the following comparative table, published in a recent issue of an important British machine tool journal, shows the figures of British exports and imports of machine tools for four years, viz.: before the war; the peak year of 1929 (which is given the index figure of 100), and the last two years:

Outlook for American Machine Tools

During the past two years there has been an increasing tendency toward the manufacture of American machine tools on a royalty or license basis in this district by firms which hitherto directly imported these products. This development has been largely dictated by an adverse sterling-dollar exchange and the imposition of British tariffs upon all classes of machinery other than such as cannot be competitively manufactured in Great Britain. Since these tariffs became operative over two years ago, the home market for American machine tools has greatly diminished in favor of similar products of British manufacture, and the home trade for the domestic product has been greatly stimulated. Although the position has been relieved since the revaluation of American currency, the continuance of British import duties, coupled with the advantages which British manufacturers have already gained in the home market, still reacts unfavorably against the sale of imported American machinery of standard and more ordinarily used types. Existing competition in this direction is stated to be almost wholly of a domestic character, the importation into Great Britain of similar classes of machine tools from Germany having considerably decreased owing to factors of currency exchange and import duty.

The sale of special high production American machine tools, which can be admitted into Great Britain free of duty, is well maintained, and it is becoming increasingly evident that this will afford the only important avenue of trade in the immediate future.

COMPARISON OF EXPORTS AND IMPORTS

Four months Actual for current & averages for preceding periods	Weight Tons	Value Total £	Per Cent of 1929	Ton Value £
	Exports of Machine Tools			
1913	5,512	337,600	47	61
1929	5,411	717,671	100	133
1933	2,967	422,260	59	142
1934	3,081	397,596	55	129
	Imports of Machine Tools			
1913	1,284	120,480	19	94
1929	3,692	650,475	100	176
1933	1,120	282,888	43	253
1934	1,662	379,815	58	228

September Business Activity Declined

BUSINESS activity declined measurably in September, according to the monthly report of the conference of statisticians in industry of the National Industrial Conference Board. The succession of downward movements in recent months wiped out advances made since last November, and brought the general level of production to where it was in the second quarter of 1933. Production in major industries declined more than seasonally in September. General distribution and retail trade advanced in September over August by amounts less than seasonally usual. The cost of living continued to advance.

Automobile production was sharply curtailed in September, the decline being greater than seasonal under August. Steel and iron output was similarly contracted. Building and engineering construction awards, as a whole, fell off more than usual for the month, although publicly-financed awards showed a slight advance over the August total. Electric power production declined by a more than seasonal amount. Bituminous coal output advanced slightly in September but less than expected for the time of the year. Textile production declined to a new depression low because of the strike, but activity in the opening weeks of October showed measurable improvement.

In the first three quarters of 1934 Russia placed orders in France for some 140 million francs, mainly for iron and steel, chemical, electrical goods, etc. Under the Franco-Russian agreement of January, Russia pledged herself to take 250 million francs of French goods during 1934.

Rehabilitation Work Doubled This Year

Rehabilitation and improvement of neglected property of all kinds is growing into a national program, according to Thomas S. Holden, vice-president, F. W. Dodge Corpn. Contracts for alterations and additions to all classes of structures have doubled in volume this year as compared with last year. In the 37 Eastern States the amount of such work recorded in the first nine months of this year was $277,878,300, compared with $139,418,000 for the corresponding period of 1933.

A little over half of this year's modernization expenditures were made on privately-owned commercial, industrial and residential buildings. The largest single item in this year's record was $56,213,800 for commercial building improvements, a 69 per cent increase for this class of work over the corresponding period of last year; alterations and improvements for residential structures amounted to $45,977,100, a 36 per cent increase over last year. These figures do not include small repair jobs, or many jobs resulting from loans made under the new Federal Housing Administration plan.

Advocates New Material In Farm Architecture

WASHINGTON, Oct. 23.—Cheaper methods of constructing farm buildings, including the use of metal sheets and other newer products, such as plywood, asbestos and cement products, were urged by Wallace Ashby of the United States Bureau of Agricultural Engineering in an address on Oct. 17 before members of the North Atlantic section of the American Society of Agricultural Engineers, at Amherst, Mass. He advocated the use of these products as well as new forms of insulation, roofing and flooring materials in addition to the usual materials.

Estimating that at least one-half of 6,250,000 farmhouses in the country are structurally sound except for minor repairs, Mr. Ashby said that about one house in six probably should be replaced. Sound structures, it was stated, could be improved greatly by intelligent remodeling and installation of modern equipment.

He also pointed out the possibility of farmers in a community organizing their building program to reduce construction costs. Under such a system local builders could arrange for purchase of materials in large quantities over longer periods of time and could, no doubt, afford to provide themselves with labor-saving equipment.

A new bulletin containing sketches and floor plans of 40 farmhouses has already been compiled by the bureau to aid farmers planning to build new homes. This is Farmers' Bulletin 1738-F, "Farmhouse Plans," just published by the Department of Agriculture.

With the changes in location of roads and in surfacings and with the shift from horse-drawn to motor traffic, new principles of farm arrangement enter the farm picture, Mr. Ashby said. Many farmsteads which were declared to have been ideally located and planned when the buildings were erected could be improved by rearrangement as new buildings are erected, and, in some instances, the old farmstead might be profitably abandoned in favor of a new location.

The estimated number of houses needing remodeling and the number of replacements are based on information gathered in the recent farmhouse survey made by the Bureaus of Agricultural Engineering and Home Economics of the United States Department of Agriculture in cooperation with State colleges with funds of the Civil Works Administration.

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Metallurgical and Chemical Use

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DETROIT - CHICAGO

Harbison-Walker Gets Forsterite Patents

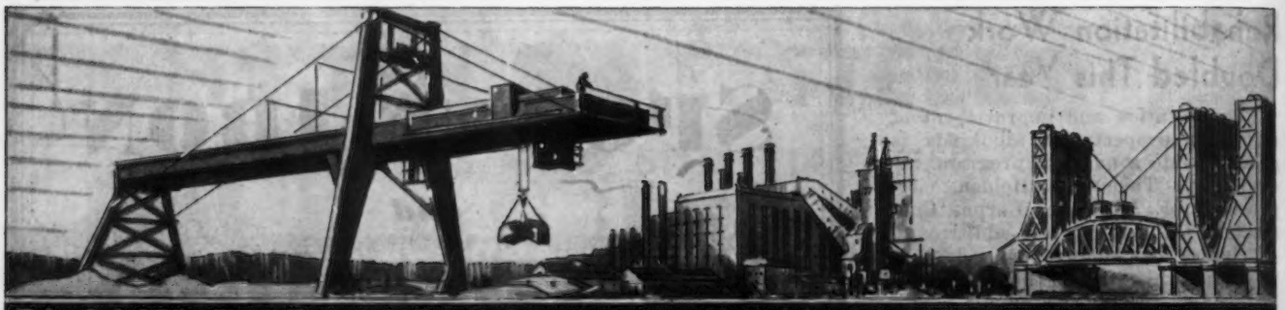
THE Harbison-Walker Refractories Co., Pittsburgh, has announced the acquisition of the American rights to the forsterite patents of Goldschmidt and his associates through an exclusive royalty granted by Dr. Victor M. Goldschmidt of Göttingen, Germany. These patents cover refractories made of olivine and of the other magnesium silicates. Included in the group are more than a dozen United States and Canadian patents.

Forsterite has a melting point of 1910 deg. C. (3940 deg. F.). It is the only magnesium silicate which will remain stable at the temperature at which many industrial furnaces operate. Forsterite has the chemical formula 2 MgO: SiO_2, and is the principal constituent of the more refractory olivines.

Construction Projects Lower in September

THE volume of new construction projects started in the 37 Eastern States during September totaled $110,219,200, according to the contract records of F. W. Dodge Corpn. This represents a loss of more than 8 per cent when compared with the August volume of $120,014,600 and approximately the same percentage decline from the September, 1933, total of $120,134,400.

An examination of the construction classes indicates no pronounced decline in any specific type of building. Residential building contracts awarded during the month totaled $17,871,600 as compared with $18,641,000 for August and $21,549,000 for September of last year. Non-residential building during the month amounted to $42,359,300 as contrasted with $50,816,900 for the preceding month and $37,836,300 for the corresponding month of last year. Public works, with increased highway work, showed an actual increase over August, the totals amounting to $43,478,500 and $41,905,900 respectively.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Inquiry Is Brisk With Single Unit Orders More Numerous

WITH inquiry for machine tools definitely larger than was the case last month, orders for single tools are reported to be more numerous in some districts. Such business represents the very pressing needs of manufacturers who have been unable to put off purchases any longer. The volume of inquiry already pending indicates heavier orders in the closing months of the year.

It is estimated that the automotive industry has already awarded $6,000,000 to $7,000,000 worth of tool and die work for 1935 models, and before this activity is completed it is likely that from $11,000,000 to $12,000,000 will be spent. One large company has already made expenditures of $6,200,000 for tooling, engineering, machinery and equipment and plant rearrangement.

NORTH ATLANTIC

Continental Can Co., 1 Pershing Square, New York, has let general contract to Austin Co., Cleveland, for three-story addition to branch plant at Houston, Tex., 80 x 160 ft. One-story loading and distribution shed, 67 x 230 ft., also will be built. Cost about $350,000 with machinery.

Anheuser-Busch, Inc., 515 West Sixteenth Street, New York, brewer, with main plant at St. Louis, has approved plans for new multi-story factory branch, storage and distributing plant at Twelfth Avenue and Thirty-third Street. Cost over $100,000 with equipment

Navy Department, Navy Yard, Brooklyn, plans improvements and repairs to buildings and equipment at local yard to replace recent damage by storm, including cranes and crane facilities, and other heavy equipment. Fund of $60,535 has been authorized.

Royal Metal Box Corpn., Brooklyn, has been organized by Samuel and Roy Halper, 238 Forty-sixth Street, and associates, to manufacture metal boxes and containers.

Board of Education, Park Avenue and Fifty-ninth Street, New York, plans manual training department in new four-story and basement junior high school at Amsterdam Avenue, 129th to 130th Street. Cost $1,100,000. Fund has been secured through Federal aid. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until Oct. 29 for 100 acetylene flasher mechanisms for automatic control of flashing acetylene beacons and buoys (Proposal 47313); until Nov. 1, converting tender Hawthorn from coal to oil-burning, including steel tanks and equipment (Proposal 47307).

Gregor Aircraft Corpn., Mineola, L. I., has been organized by Murray A. Schectman, 70 Pine Street, New York, and associates, capital $100,000, to manufacture airplanes and parts.

Momrow Coal & Coke Service, 324 Fiftieth Street, Brooklyn, has leased property in Bush Terminal district for construction of large coal pocket, with conveying, elevating, loading and other mechanical-handling equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 30 for steam whistles and spare parts (Schedule 3511); until Nov. 2, motor-generator sets, controllers and spare parts (Schedule 3574), seven 3-ton capacity refrigerating plants and spare parts (Schedule 3520), shaft revolution indicator systems and spare parts (Schedule 3498) for Brooklyn, Philadelphia and Charleston, S. C., navy yards.

Board of Education, School District of Merrick, L. I., and neighboring School Districts of North Merrick, Bellmore and North Bellmore, plan manual training department in new multi-story central high school to serve entire territory. Cost about $675,000 with equipment. Plans will soon be drawn.

North American Die Works, 35 Great Jones Street, New York, manufacturer of steel dies, etc., has leased floor in building at 10 Washington Place for new plant.

Economy Hy-Heat Coal Co., Inc., 654 Kent Avenue, Brooklyn, has leased property at Flushing, L. I., 100 x 150 ft., for new storage and distributing plant, and will build coal pockets, with elevating, conveying, loading and other mechanical-handling equipment. Cost about $30,000.

Worthington Pump & Machinery Corpn., Harrison, N. J., has organized subsidiary under name of Carbondale Machine Corpn., to take over Carbondale Machine Co., Carbondale, Pa., manufacturer of refrigerating machinery, air-conditioning equipment, etc., recently acquired.

Board of Education, Chatham, N. J., plans manual training department in new multi-story high school. Fund of $386,000 has been secured through Federal aid. W. A. Pieper is architect for board.

Whyte Spark Plug Co., East Orange, N. J., has been organized, capital $125,000, by Joseph A. E. Whyte, North Munn Avenue and Summit Street, and associates, to manufacture spark plugs and kindred automobile equipment.

Star Show Case Mfg. Co., 412 Locust Street, Philadelphia, manufacturer of show cases, store equipment, etc., plans rebuilding part of plant recently destroyed by fire. Loss over $75,000 with equipment.

Philadelphia Piers, Inc., Pier 96, Delaware River, Philadelphia, plans one-story steel storage and distributing shed, 90 x 1000 ft., with conveying, loading and other mechanical-handling equipment. Cost over $75,000 with equipment.

Penn Argyl School District, Penn Argyl, Pa., plans manual training department in new two-story and basement school. Cost $165,000. Fund has been secured through Federal aid. Jacoby & Everett, Commonwealth Building, Allentown, Pa., are architects.

Independent Mfg. Co., Aramingo Avenue and Wheatsheaf Lane, Philadelphia, manufacturer of greases, lubricants, etc., has let general contract to Joseph R. Farrell, 21 South Forty-sixth Street, for one-story plant addition.

NEW ENGLAND

General Electric Co., Schenectady, N. Y., has developed new line of radio receivers and will use part of plant at Bridgeport, Conn., for production, beginning early next year. Engineering division for radio work has been transferred from Schenectady to Bridgeport, where entire branch of industry will be concentrated.

Sinclair Refining Co., 671 Memorial Avenue, West Springfield, Mass., with headquarters in New York, has plans for new bulk oil storage and distributing plant, including warehouse, 25 x 98 ft., pumping plant, steel tanks, etc. Cost about $40,000 with equipment.

Board of Education, Mexico, Me., plans manual training department in new two-story high school, for which bids will be asked soon on general contract. Cost $100,000. Fund is being secured through Federal aid.

Eastern Products Co., Salem, Mass., has been organized by Richard E. Blake and Robert H. Sproul, 70 Washington Street, to manufacture machinery and parts.

New England Alcohol Co., Chemical Lane, Everett, Mass., will equip new two-story plant, 60 x 72 ft., for which plans were recently filed, for manufacture of dry ice, as a by-product division. Cost about $40,000 with machinery. Company is affiliated with Monsanto Chemical Co., Monsanto, St. Louis.

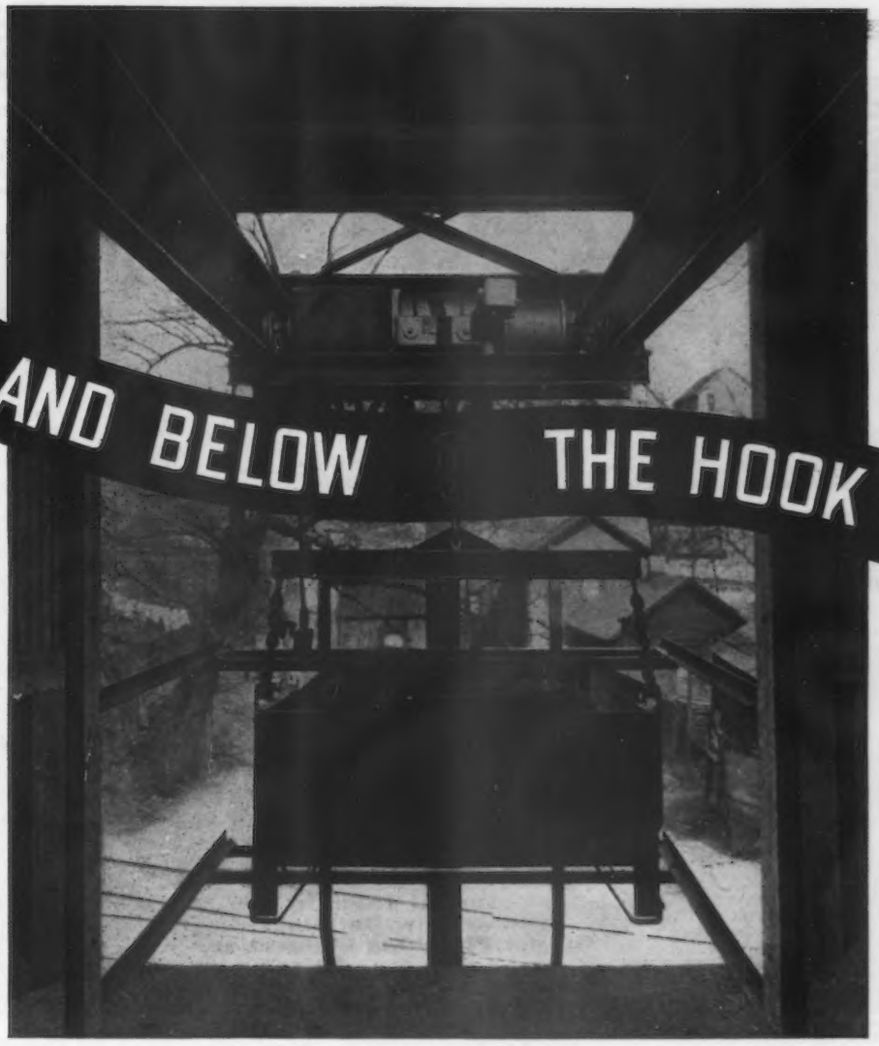
Board of Trustees, Pownal Street School, Pownal, Me., plans extensions and improvements in steam power plant, for central heating service at institution, including new equipment. Work will be carried out in connection with building program to cost over $400,000. Addition will be built to mechanical laundry. H. S. Coombs, 11 Lisbon Street, Lewiston, Me., is architect; Fels Co., 42 Union Street, Portland, Me., is consulting engineer.

BUFFALO DISTRICT

Nineteen Hundred Corpn., Binghamton, N. Y., manufacturer of electric washing machines, ironers, parts, etc., plans expansion and improvements in main local plant and branch plant at St. Joseph, Mich., including equipment. One-story addition will be built at last noted works, totaling about 35,000 sq. ft. floor space. Cost about $100,000 with machinery. Company is affiliated with Upton Machine Co., same address.

Triangle Electric Co., Inc., Ithaca, N. Y., has been organized by Leonard D. Allen, 716

ABOVE AND BELOW THE HOOK



"Above the Hook" problems are solved by the correct combination of Osborn Tramrail units.

"Below the Hook" problems are solved by the correct Osborn-designed Grab equipment.

TO OVERLOOK possibilities of reducing costs through adoption of better materials handling methods is the same as ignoring opportunities for increasing profits. . . . Right now there may be materials handling operations in your plant that can be changed from loss-producers to profit-makers by the correct application of Osborn Tramrail units. . . . Check up on your materials handling methods. But before you invest in materials handling equipment, INVESTIGATE Osborn Tramrail Systems!

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Armstrong Cork Co.
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Canadian National Railways
Celanese Corporation
E. I. du Pont de Nemours & Co.
Eastman Kodak Company
General Electric Company
General Motors Corp.
Grasselli Chemical Co.
Hawaiian Pineapple Co.
International Cement Corp.
International Harvester Co.
Los Angeles Gas & Electric
Nash Motor Company
Norfolk & Western Railway
Owens-Illinois Glass Co.
Packard Motor Car Co.
Pennsylvania Railroad
Premier-Pabst Corporation
Quaker Oats Company
Republic Steel Corp.
Shell Petroleum Corp.
United States Government
U. S. Gypsum Co.
U. S. Metals Refining Corp.
U. S. Rubber Co.
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There is a Bradley Fixture for every Group Washing requirement and for every budget.

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Users of group washing equipment—Bradley Washfountains and Group Showers report reductions of water bills as high as 70%.

At the Washfountain 10 persons can wash at one time and the water consumed is but slightly more than one person uses at an ordinary faucet. The 70% water reduction actually pays for Bradley Washfountains in a short time and the savings continue to add to profits for years to come.

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Similar savings in water costs, savings in space and maintenance are features of the Bradley Group Showers. They are made in 3-stall and 5-stall models,—both units easy to install.

Install Them in Old or New Buildings— Only 3 Plumbing Connections

You can easily remodel and modernize washrooms in your present buildings and gain the permanent monthly savings that Bradleys make possible. Only three plumbing connections are required, making for lower installation and maintenance costs.

Used in Large and Small Plants, Schools, Institutions, Air-ports, etc.

Hundreds of thousands of people the country over are using Bradleys daily—many have ordered repeatedly, some 30, 40 and 50 times as their needs increased. Representative users are listed in the left-hand column. BRADLEY WASHFOUNTAIN CO., 2239 W. Michigan St., Milwaukee, Wis.

Bulletin B66 mailed on request

BRADLEY

WASHFOUNTAINS and SHOWERS

North Cayuga Street, and Charles W. Lewis, 113 West Lincoln Street, to manufacture electrical equipment and devices.

A. B. C. Malting Co., Ltd., Toronto, Ont., plans new multi-unit plant, with main malt house, cleaning and drying plant, storage and distribution elevator, and other structures. Cost over $175,000 with equipment.

OHIO AND INDIANA

Lincoln Electric Co., 12818 Coit Road, Cleveland, manufacturer of electric welding equipment, motors, parts, etc., has let general contract to Austin Co. for two-story addition, 182 x 187 ft. Cost about $100,000 with machinery.

Tower Oil Co., 607 Mitchell Avenue, Cincinnati, has let general contract to Dawson-Evans Construction Co., 5300 Carthage Pike, for new bulk oil storage and distributing plant, including pumping plant, steel tanks with capacity of about 1,800,000 gal., repair garage and other structures. Cost about $45,000. Roy Moore, Elmwood, Ohio, is architect.

Ball Rite Valve Co., Cleveland, has been organized by M. Klaus and associates, represented by Donald B. Loventhal, Hanna Building, to manufacture valves and kindred engineering specialties.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Oct. 30 for 300 airspeed indicator assemblies (Circular 196); until Nov. 1, indicator assemblies (Circular 165); until Nov. 2, ammeters and voltmeters (Circular 169), 700 manifold pressure gage assemblies (Circular 194); until Nov. 5, about 430,000 ft. tinned copper braid (Circular 221), photo flashing lamp assemblies (Circular 223); until Nov. 8, wheel and brake assemblies (Circular 189), booster coil switch handle finger assemblies, booster coil supports, booster coil switch mounting clamp assemblies, and booster coil switch shielding box assemblies (Circular 209), 350 oil tank heaters (Circular 215), discharge and vent pipes, discharge pipe gaskets, discharge vent arms, discharge valve rods, upper and lower discharge valve washers, vent valves, and vent valve spring washers (Circular 210).

Village Council, Hiram, Ohio, will soon call for bids for equipment for municipal electric light and power plant, including Diesel engine-generator and accessories. Cost about $32,000. R. Husselman, Hippodrome Building, Cleveland, is consulting engineer.

Safety Air Transportation Co., Indianapolis, Arthur Williams, head, recently organized to manufacture new safety-type airplanes and parts, has taken over property on Allisonville Road for erection of one-story plant, primarily for assembling. Cost over $40,000 with equipment.

WESTERN PENNA.

United States Engineer Office, Huntington, W. Va., closes bids about Nov. 20 for new roller gate type dam at Gallipolis lock and dam, Ohio River, including six standard roller gates, two crest-flap type locker gates and eight operating houses.

Aluminum Co. of America, Inc., Gulf Building, Pittsburgh, has plans for one-story foundry, 85 x 100 ft., at Cleveland plant. Cost about $40,000 with equipment.

Sun Oil Co., 1608 Walnut Street, Philadelphia, plans new bulk oil unloading and distributing plant on Ohio River at Kenova, W. Va., including steel tanks, pumping station and other structures.

Gulf Refining Co., Seventh and Grant Streets, Pittsburgh, will soon begin work on new bulk oil storage and distributing plant at Cincinnati, with steel tanks, boiler house, etc. Cost close to $100,000 with equipment.

SOUTH CENTRAL

Board of Public Works, City Hall, Memphis, Tenn., plans new municipal abattoir. Cost about $150,000 with equipment. Financing has been arranged through Federal aid.

Village Council, Ridgeland, Miss., asks bids until Nov. 6 for 5000-gal. galvanized steel tank on wood tower, pipe lines, etc., for municipal waterworks. H. R. Covington, Canton, Miss., is consulting engineer.

A. Ph. Stitzel Co., affiliated with W. L. Weller & Sons, Starks Building, Louisville, distiller, operating as Stitzel-Weller Distillery, has let general contract to A. Markham & Co., 432 South Floyd Street, Louisville, for initial units for new plant at Jeffersontown, Ky., including steam power plant, machine shop and other structures. Cost over $80,000 with equipment. Joseph & Joseph, Breslin Building, Louisville, are architects and engineers. J. P. Van Winkle is president of Stitzel company.

SOUTHWEST

Board of Education, Colby, Kan., plans manual training department in new two-story and basement community high school, for which bids will be asked on general contract in about 60 days. Cost about $200,000. Mann & Co., Rorabaugh-Wiley Building, Hutchinson, Kan., are architects.

Board of Public Works, St. Charles, Mo., asks bids until Oct. 29 for pumping machinery, filtration and purification equipment, pipe lines, etc., for municipal water system. Fund of $65,000 has been arranged through Federal aid. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

H. Sokolik Packing Co., 1719 North Vandeventer Avenue, St. Louis, meat packer, has asked bids on general contract for addition, 46 x 80 ft. Cost close to $50,000 with equipment. Menges-Mange, Inc., 1515 North Grand Boulevard, is architect.

New Mexico Power & Light Co., White Oaks, N. M., plans rebuilding part of power plant recently destroyed by fire. Loss about $100,000 with equipment.

City Council, Kingman, Kan., has authorized extensions and improvements in municipal electric light and power plant, including new Diesel engine and auxiliary equipment. Cost about $30,000.

Board of Education, Blackwell, Okla., plans manual training department in new multi-story high school, for which bids are being asked until Nov. 1 on general contract. Cost about $225,000. L. I. Shumway, Tulsa, Okla., is architect.

Orange County Water Co., Orange, Tex., asks bids until Oct. 29 for pumping machinery

Die Casting Efficiency
starts in the melting pot

Close-up of gas-fired melting pot of die casting machine, showing in left background Bristol's Motor Operated Controller Valve, Type BK.

Bristol's Pyrometer Controller, Model 478. One of three similar units at the Mount Vernon Die Casting Co., Mt. Vernon, N. Y.

HERE the molten metal must be heated carefully. Otherwise there are likely to be fluctuations in its temperature that not only will cause it to interfere with the operation of the casting machine but also impair the quality, strength and durability of the ultimate product.

By installing Bristol's Pyrometer Controller and Motor Operated Controller Valve, the Mount Vernon Die Casting Company finds that temperatures are reliably maintained within close limits of the current casting point. Blow holes in thin sections are abolished. Rejects due to over or underheated metal are eliminated. Fuel is saved.

Perhaps Bristol's Automatic Control may bring you comparable economies. Write.

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Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas Electric and Diesel-Electric Locomotives

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Concentrate and Calcine Cars for Copper Refineries

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Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.

Engineers - Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

and auxiliary equipment for new pumping plant. W. B. Gregory and Merrill Bernard, Orange, are engineers.

Baash-Ross Tool Co., 5512 Boyle Avenue, Los Angeles, manufacturer of oil-well drilling tools and equipment, has taken out permit for one-story branch plant at Houston, Tex. Cost about $25,000 with equipment.

Board of Education, Fort Worth, Tex., plans vocational training department in new polytechnic high school. Cost about $400,000 with equipment. Joseph R. Pelich, Trinity Life Building, is architect.

SOUTH ATLANTIC

City Council, Central, S. C., asks bids until Oct. 30 for three centrifugal pumping units and accessories, 75,000-gal. elevated steel tank and tower, 250,000-gal. per day filtration plant, pipe lines, etc., for municipal waterwork. Harwood Beebe Co., Spartanburg, S. C., is consulting engineer.

Carolina Power & Light Co., Raleigh, N. C., plans power transmission line from Marion to Sellers, S. C., about 10 miles. Cost about $25,000 with equipment. Work has been authorized by South Carolina Railroad Commission.

Haywood County Canning Co., Hazelwood, N. C., food products, including meat packing, plans additions. Cost about $35,000 with equipment. Fund has been secured through Federal aid.

Monarch Machine Products Co., Greensboro, N. C., has been organized by R. N. Hadley and Fred Carlson, Greensboro, to manufacture machine specialties and other mechanical products.

Nantahala Power & Light Co., Bryson City, N. C., J. E. S. Thorpe, president, is considering power transmission line from Sylva, N. C., to Culowhee, N. C., and vicinity, for electric light and power service. Cost over $30,000 with distribution equipment.

MIDDLE WEST

Illinois Meat Co., 3939 Wallace Street, Chicago, meat packer, has let general contract to Rune & Sons, 6753 Stony Island Avenue, for addition, 31 x 100 ft. Cost about $40,000 with equipment. H. Christianson is company architect.

Fleischmann Co., 2655 West Nineteenth Street, Chicago, manufacturer of yeast and kindred food products, has begun multi-story addition to plant on Fifty-first Street. Cost close to $100,000 with equipment.

City Council, Devils Lake, N. D., has plans for new municipal electric light and power plant. Cost $300,000 with equipment. Financing has been arranged. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Rath Packing Co., Waterloo, Iowa, has let general contract to Stone & Webster Engineering Corpn., Boston, for addition to power plant, to include installation of turbo-generator unit, boilers, pumps and auxiliary equipment. Cost about $175,000 with machinery.

Superintendent of Construction, Indian Service, Billings, Mont., asks bids until Oct. 29 for one horizontal centrifugal pumping unit with accessory equipment, gasoline engine-driven, and for two dry chemical feed machines.

City Council, Two Harbors, Minn., is considering power transmission line, about 35 miles, for local light and power service, with substation and switching station. Cost over $50,000. Rudolph Erickson, city electrician is in charge.

Rocky Mountain National Park, Edmund B. Rogers, Estes Park, Colo., superintendent, has plans for new one-story machine shop, 40 x 103 ft.

Albert Lea Food Products Co., Albert Lea, Minn., has plans for extensions and improvements, including new tank house and other units. C. M. Tapager, Home Investment Building, is general contractor. One-story machine and mechanical shop, including service and garage building, will be erected later. Entire project will cost close to $100,000 with equipment. Company is affiliated with Ward Dry Milk Co., 201 Custer Avenue, St. Paul, Minn.

Perfex Radiator Co., 415 West Oklahoma Avenue, Milwaukee, has acquired C. R. C., Inc., Beloit, Wis., manufacturer of radio parts, and is changing title to Perfex Controls Co. Business will be expanded and new lines added to principal present products, switches and vibrators for automobile installations.

MICHIGAN DISTRICT

Leonard Refrigerator Co., Grand Rapids, Mich., a subsidiary of Kelvinator Corpn., Detroit, manufacturer of electric refrigerators, porcelain enameled cabinets, etc., has approved plans for extensions and improvements, including enlargement of enameling division. Cost about $100,000 with equipment.

Excello Die Casting Co., Grand Rapids, Mich., recently organized by Edward J. Hultman, 1140 Monroe Avenue, N. W., and associates, has leased space in factory, recently purchased by Grand Rapids Plating Co., from Perkins Estate. Last noted company has removed from Richards building to new factory where capacity will be increased.

Sparta Coach & Body Co., Sparta, Mich., has been organized by Erastus W. Smith, Sparta, and associates, capital $140,000, to manufacture automobile bodies and parts.

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, has let general contract to O. W. Burke Co., Detroit, for one-story addition to plant of Plymouth Automobile Division, for storage and distribution. Cost about $60,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

WASHINGTON DISTRICT

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Oct. 31 for relocating hangar at Marine Barracks, Quantico, Va., including new pressed steel doors, steel windows, metal-covered partitions, etc. (Specification 7082).

Gunther Brewing Co., Inc., 1211 Conkling Street, Baltimore, has plans for one and two-story additions, 60 x 200 ft., and 100 x 200 ft., for storage and distribution and other service. Cost over $60,000 with equipment. Charles H. Osborne, 222 West Franklin Street, is consulting engineer.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Oct. 30 for one 10,000-gal. gasoline steel tank (Circular 62); until Nov. 10, 24,500 ft. of fire hose (Circular 63).

William T. Schluderberg-T. J. Kurdle Co., Baltimore and Eaton Streets, Baltimore, meat packer, asks bids on general contract until Oct. 29 for four-story addition, 50 x 110 ft. Cost over $75,000 with equipment.

Bureau of Supply, Procurement Division, Treasury Department, Washington, asks bids until Nov. 2 for tool requirements for period Jan. 1-Dec. 31, 1935, including drills, glass and pipe cutters, grindstones, belt lacing machines, hammers, chisels, bits, saw blades, anvils, awls, axes, calipers, screwdrivers, saws, picks, shears, pipe taps, wrenches, vises, valve reseaters, screws, clamps, countersinks, etc. (Class 41).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 30 for 34 motor-driven drilling machines and spare parts (Schedule 3479), steel wire nails (Schedule 3529) for Eastern and Western yards; 42,000 firing pin springs and 42,000 rotor detent springs (Schedule 3560) for Washington yard.

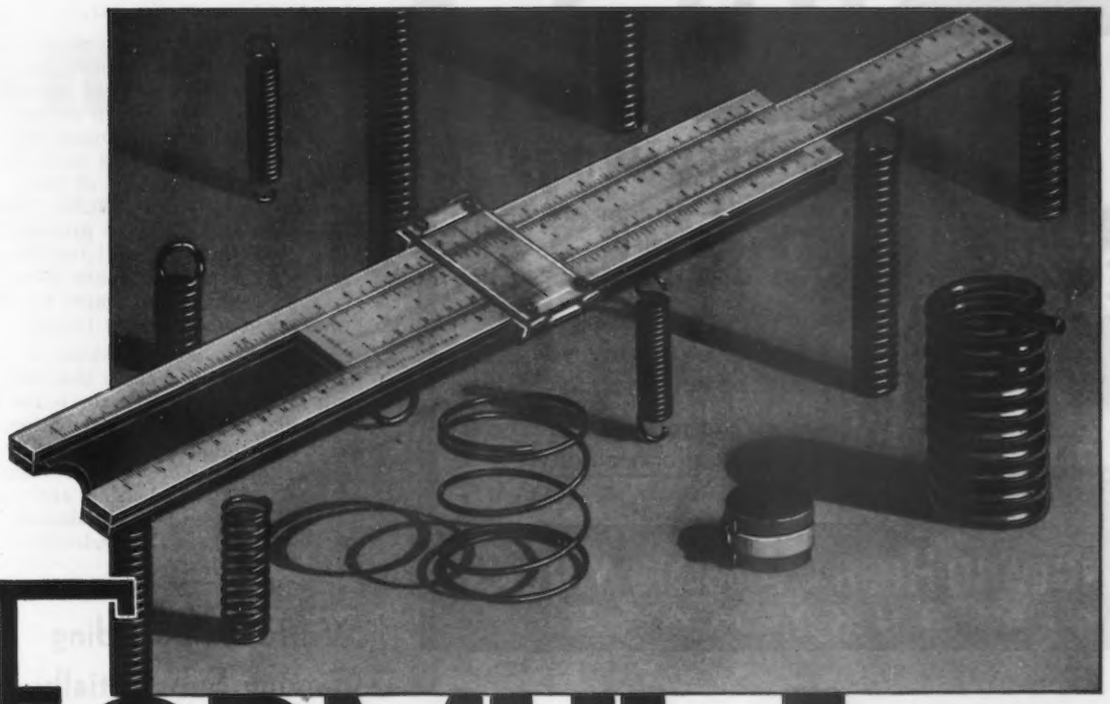
PACIFIC COAST

Los Angeles Brewing Co., 1920 North Main Street, Los Angeles, has plans for one-story addition, 75 x 150 ft., primarily for storage and distribution. Cost about $45,000 with equipment. Llewellyn A. Parker, Architects' Building, is architect.

California Corrugated Culvert Co., Fifth and Parker Streets, Berkeley, Cal., manufacturer of corrugated and other metal culverts, pipe, etc., has plans for one-story addition. Cost about $21,000 with equipment.

Bureau of Reclamation, Denver, asks bids until Nov. 1 for combined one-story warehouse, garage and mechanical shop building and one-story laboratory at Government camp, Parker Dam, Parker Dam Project, California-Arizona (Specification 624-D).

San Poil Power & Light Co., Republic, Wash., plans rebuilding part of power plant



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Empire State Building, New York
First National Bank Building, Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

Export Distributors: United States Steel Products Company, New York

recently destroyed by fire. Loss about $85,000 with equipment. S. S. Frantz is secretary.

Graybar Electric Co., 301 East Eighth Street, Los Angeles, distributer of electrical appliances and equipment, with main offices in New York, has let general contract to William P. Neil Co., 4814 Loma Vista Avenue, for new three-story storage and distributing plant, with service and repair shop, parts department, etc., 107 x 160 ft. Cost about $100,000 with equipment. Harry T. Miller, 4814 Loma Vista Avenue, is architect.

Vacuum Power Brake Co., Los Angeles, has been organized by G. E. Jones, Glendale, Cal., and D. L. Eversole, Los Angeles, represented by David R. Faries, Subway Terminal, to manufacture power brakes and parts and kindred equipment.

Kirkhill Rubber Co., 5801 South Hoover Street, Los Angeles, manufacturer of rubber specialties, has let general contract to John F. Meredith, 1451 North Highland Avenue, for one-story addition, 80 x 112 ft. Harry T. Miller, 4814 Loma Vista Avenue, is architect.

◀ FOREIGN ▶

Soviet Russian Government, Moscow, has selected large tract at Rostov on Don River as site for new automobile assembling works, including motor trucks and passenger cars. Plant will include power house and other mechanical departments, and will have initial output of about 30,000 cars a year, of which close to 75 per cent will be trucks. Cost over $2,000,000 with machinery. Construction is scheduled to begin early next year. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency.

South African Railway and Harbor Administration, Johannesburg, South Africa, asks bids on general contract until Nov. 19 for new mechanical precooling plant at East London, South Africa. Cost close to $1,000,000 with machinery.

Yung Li Salt Co., Ltd., Tientsin, China, L. Wan, managing director, plans works for production of sulphuric acid and allied products near Pukow, Liu Ho district, China. Tract of over 400 acres has been purchased. Plant will include power house, pumping station and machine shop. Cost close to $500,000 with equipment.

Consumers Steel Products Corpn., Detroit, iron and steel warehouse and machinery distributer, has removed to new quarters at 6450 East McNichols Road.

Institute Backs Steel Frames for Dwellings

THE historic tie-up with skyscrapers has to some extent reacted against steel as a structural material for private residences, according to the American Iron and Steel Institute. For some time the public could not realize that the very material which makes skyscrapers possible holds great advantages for a five-room house. The public is being taught steel's advantages, however, says the institute, and now that the steel-framed house is no longer a designer's dream or an experiment in engineering, home builders are seriously considering steel framing.

Steel-framed houses of every size and description have been built in this country, to the great satisfaction of architects, builders and owners. Architects like the greater freedom of design which a strong structural material makes possible. Builders like steel frames because they do not shrink or warp, causing plaster cracks and other like troubles which may develop at any time in a wood-framed house.

These are advantages to home owners also, but there are others which have more direct appeal: The fire hazard is reduced; danger from lightning is completely eliminated; termites and vermine are foiled; permanency is assured.

Owners also appreciate the fact that these advantages are available at little additional cost. A steel-framed house costs only 1 or 2 per cent more than one with a wood frame, and the maintenance expense is so much lower that this differential can sometimes be absorbed in a single year.

A steel-framed house requires about 1¼ tons of steel per room. (A room 15 x 20 ft. is considered average.) A five-room house, which is the size of 50 per cent of the houses built in this country today, thus calls for a little more than six tons of steel. In normal times, about 300,000 houses are built every year; at present less than 1 per cent of them have all-steel frames. Ten per cent more use up to two tons of structural shapes for floor beams, door and window lintels.

The problem of converting to steel a majority of the houses that will be built in the future calls for sound engineering, selling and distribution. A happy combination of these three forces, notably through the medium of many local fabricating and sheet metal shops, has already dented the market. This dent is gradually deepening.

World Shipbuilding Gaining Substantially

A CONTINUATION of the trend toward greater production of merchant shipping throughout the world is shown by the returns of Lloyds Register of Shipping for the quarter ended Sept. 30. Nearly 100,000 gross tons more of merchant vessels are now under way than in the preceding quarter. The returns cover all ships of 100 gross tons and upward being constructed in all countries except Russia, for which no figures have been available for some time.

As compared with a year ago, world shipbuilding shows an increase of more than half a million gross tons, a gain of nearly 75 per cent. During the quarter just ended larger production was reported for all the principal maritime countries except Italy and the United States.

Of the 1,311,387 gross tons now being built throughout the world, 46.1 per cent is being constructed in Great Britain and Ireland, 1.7 per cent in the United States, and 52.2 per cent in the other shipbuilding countries, taken as a group. Lloyd's Register shows the comparison in construction during the past two quarters in the following table of gross tonnage:

	Sept. 30, 1934	June 30, 1934
Great Britain and Ireland	604,296	587,142
United States....	22,225	27,581
Other countries...	684,866	601,617
World total....	1,311,387	1,216,340

Luntz Iron & Steel Co., Canton, Ohio, scrap iron and steel dealer, has opened a branch office in the Union Trust Building, Cleveland.

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a new member of
the AIRCO-DB
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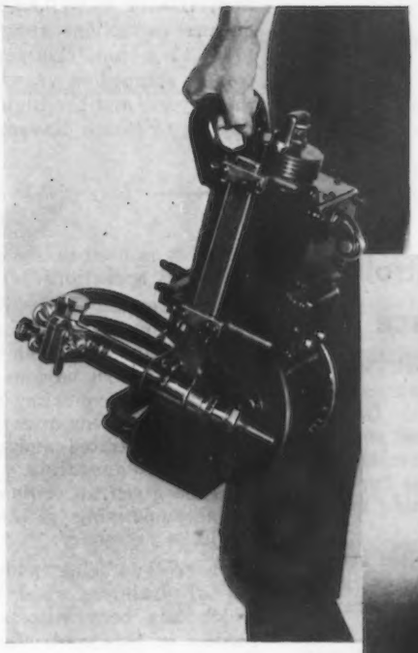

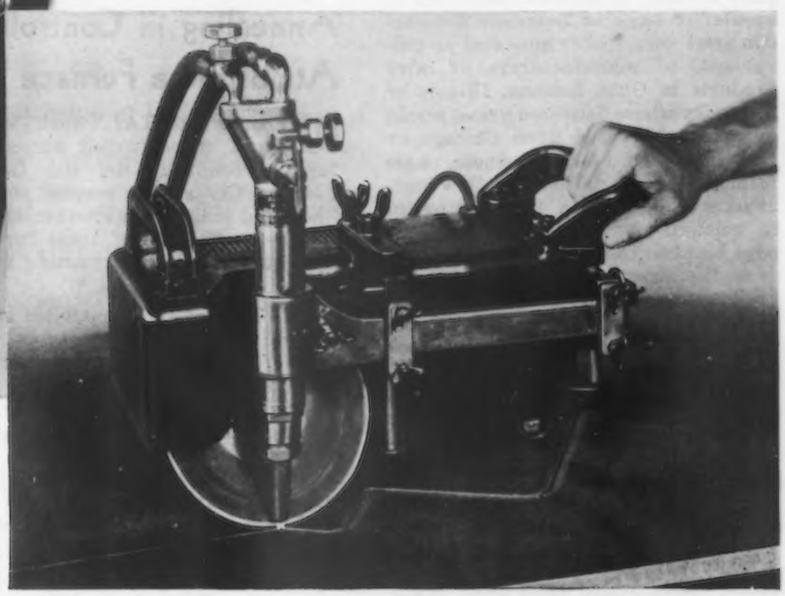

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***An entirely new principle in cutting machine drive,* combined with other features which enable the operator to change the direction of the machine with exceptional ease, makes it possible to turn sharp corners and to follow both simpie and intricate contours with unusual accuracy.**

Measuring only 7 1/3 x 8¼ x 16 inches and weighing but 48 pounds, the TRACTOGRAPH can be easily carried about and used wherever 110 volts A. C. or D. C. are available.

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Revisions in Commercial Resolutions and Regulations Announced by Institute

THE directors of the American Iron and Steel Institute have approved a new commercial resolution, providing for deductions in delivered prices for certain kinds of drawn wire sold for delivery to manufacturers at places in and around Anderson, Ind. Resolution A7 has also been amended and revisions made in Regulations Nos. 2 and 4.

The new resolution, No. A32, applies to sales of carload quantities or greater of basic or Bessemer low-carbon steel wire, either annealed or galvanized, to manufacturers of wire products in Ohio, Indiana, Illinois or Kentucky whose delivered prices would ordinarily be based upon Chicago or Cleveland. On such business, code members are permitted to allow purchasers reductions in delivered prices in amounts not exceeding the difference between the all-rail freight tariff from the above basing points and the freight rate from Anderson to the consuming point. It is further provided, however, that such reductions may not be made if the resultant delivered price is less than the sum of the published base price and the switching charge which would normally apply.

The amended Resolution A7, which is effective Oct. 18, establishes allowances on sales of iron and steel products in intrastate commerce in additional states which have sales taxes. These allowances, which are in the amounts of the respective taxes, have formerly applied in California, North Carolina and Kentucky and are now extended to Iowa, New Mexico and West Virginia.

Pipe and Tool Steel

The revisions in Regulations No. 2 apply to sales of pipe and tool steel. Cement lined pipe is added to the list of manufactured products to the makers of which price reductions are permitted, the list already including pipe nipples, fire protection sprinkler systems, ice machines, refrigerating systems, rigid conduit and power piping. The jobber agreement covering such transactions is so revised also.

Price reductions are already permitted on sales of tool steel in quantities not in excess of 30 lb. to be shipped by parcel post or express to points west of the Mississippi River. Regulations No. 2 have now been revised to permit deductions not exceeding 7c. a lb. on such shipments for delivery on or east of the Mississippi River and in or north of Kentucky, West Virginia and Virginia, and deductions of 9c. a lb. in places of delivery on or east of the Mississippi and in or south of Tennessee and North Carolina.

Pig Iron Shipped by Water

South Haven is added to the list of Michigan consuming points of pig iron on which code members may make price deductions in delivered prices of iron shipped by water, according to a revision in Regulations No. 4. The deductions, which apply only to lots of 1500 tons or more for shipment to Saginaw, Holland and Muskegon, range from $1.30 to $1.50 a gross ton, the latter figure now applying to South Haven as well as Saginaw. Additional deductions, ranging from 50c. to $1.15 a ton, are permitted when iron is shipped in vessels supplied by the buyers, and the higher figure now applies to South Haven.

Annealing in Controlled Atmosphere Furnace

DEVELOPMENTAL work in the use of a controlled atmosphere furnace conducted by the General Electric Co. at its service shop in Cleveland indicates a broadening field for the application of these furnaces for various industrial heating operations.

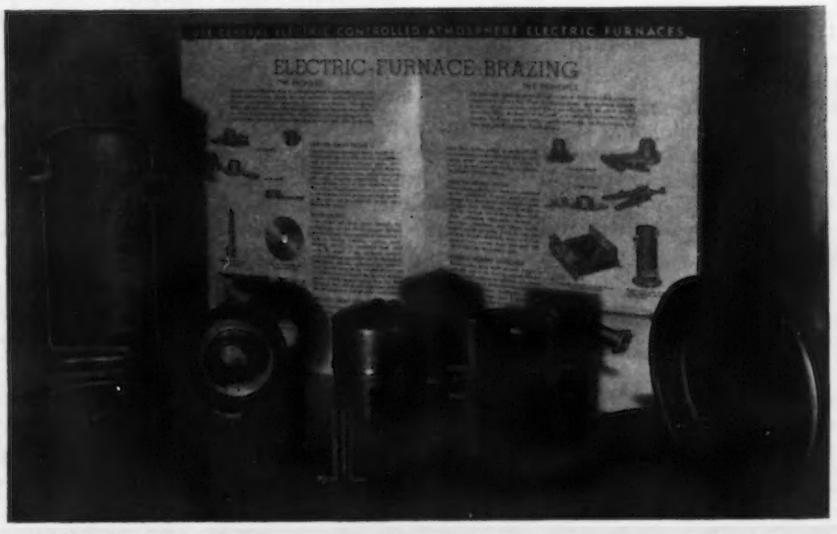
A 20-kw. box-type controlled atmosphere furnace recently was installed in this department for demonstration purposes and for developmental work in bright annealing, normalizing, and brazing. Interesting results capable of commercial application have been obtained with different metals, different temperatures and with different combinations of gases for controlling the atmosphere.

Bessemer and basic open-hearth wire and mild tool steel have been annealed to produce a bright surface. By a change in the atmosphere the same materials have come from the furnace with a blue-black gunmetal finish. Bungs for beer barrels have also been given the latter finish. The blue-black annealing of steel that is put in stock prevents it from rusting before it is used in some later manufacturing operations.

Bessemer and basic wire rods have been bright-annealed to eliminate the scale and thus save the time and cost of pickling. In various manufacturing operations, pickling of steel after annealing between drawing operations can be eliminated and costs reduced by bright annealing. Should the piece be given an ordinary annealing an accompanying pickling operation would be necessary.

Progress is being made in the brazing of stainless steel with copper, which has been successfully accomplished in this controlled atmosphere electric furnace with the use of a special flux. Progress is also being made in the brazing of other high-chromium alloy steels with copper in the controlled atmosphere furnace.

The steel works now under construction at Belur, India, are to begin operations early next year. The works will remelt scrap and manufacture ingots, billets, merchant bars and railroad material. The necessary machinery has been ordered from Japan, and Japanese engineers and steel experts are to be employed.



Samples of work annealed, normalized or brazed in electric controlled-atmosphere furnace.